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Manderson, Charles Frederick, an American soldier, lawyer and politician, was born at Philadelphia, on February 9, 1837. He removed to Canton, Ohio, in 1856, and was admitted to the bar in 1859. In 1861 he entered the volunteer army as a private and rose through successive grades to the rank of brevet brigadier-general. He was in many of the battles of the west, and was severely wounded at Lovejoy's Station, Georgia. At the close of the war he began the practice of law in Stark County, Ohio, from where he removed to Omaha, Nebraska, in 1869. He was city attorney of Omaha for a number of years, and was elected to the United States Senate in 1883, where he served until 1895, being president *pro tem* of the Senate in the fifty-first Congress.

Mandingos (*măn-dĭn′gōs*), the name given to a group of West African negroes who are estimated to number several millions. The Mandingos appear to have been confined at one time to the northern slope of the Senegambian plateau. Thence they spread by conquest over much of western Africa, retaining their language while allying themselves to a large degree with the conquered races by intermarriage. The English had commercial relations with the Mandingos as early as 1618. The French, however, cut into this trade in the eighteenth century. The Mandingos are a distinctly intelligent people, Arabic in their civilization and Mohammedan in their religion. They have been concerned in fierce Mohammedan crusades against neighboring tribes of pagans, the most remarkable being that of 1862. The mixture of non-negro blood in the Mandingos is evidenced by the frequent occurrence of aquiline noses among them. They live in walled towns built of baked clay. Some of these towns number as many as 10,000 inhabitants. They have leather, cotton, iron and gold manufactures; and carry on a considerable trade with English and French merchants.

Mandolin (*măn′dō-lĭn*), a musical instrument somewhat like the lute. The body is made by gluing together narrow pieces of different kinds of wood. A sounding-board, finger-board and neck like a guitar are added. The sound is made by a plectrum. The finest kind is the Neapolitan mandolin, with four double strings. The instrument is played by striking the strings with the plectrum held in the right hand, while the left hand regulates the notes, as in playing the violin.

Manetho (*măn′ē̇-thō*), high priest of Heliopolis, Egypt, who lived in the third century B. C. At the request of King Ptolemy Philadelphus he wrote a history of his country, which, as shown by comparing the fragments that remain with the monuments, was written from true sources. He divided the time from Menes to the conquest of Egypt by Cambyses in 525 B. C., into thirty dynasties. This division has been followed by all historians of Egypt. Manetho also wrote of the theology and religion of the Egytians.

Manfred, regent and king of Sicily, was born in 1231, a natural son of Emperor Frederick II, afterward legitimized. At the age of nineteen he became prince of Tarentum, regent in Italy for his half-brother Conrad and, later, regent in Apulia for his nephew Conradin. He was forced by the Pope to flee to the Saracens, but, returning, defeated the papal troops and in 1257 became master of Naples and Sicily. The following year he was crowned king at Palermo, on rumor of Conradin's death, and soon conquered all Tuscany. He was excommunicated by Pope Alexander IV. Charles of Anjou, brother of Louis IX of France, claimed Manfred's dominions as a gift from the Pope, and at the bloody battle of Benevento, in 1266, Manfred was treacherously slain.

Manfredonia (*män-frȧ-dô′nyä*), a seaport of Italy, is situated on the Gulf of Manfredonia, in the province of Foggia, Apulia, twenty-three miles northeast of Foggia. The town has a famous old castle and cathedral which are attractive to tourists. The exports of Manfredonia include almonds and figs. The town was founded in 1263 by Manfred, king of Sicily, and given his name. The Gulf of Manfredonia opens into the Adriatic Sea. The population of the commune of Manfredonia is about 12,000.

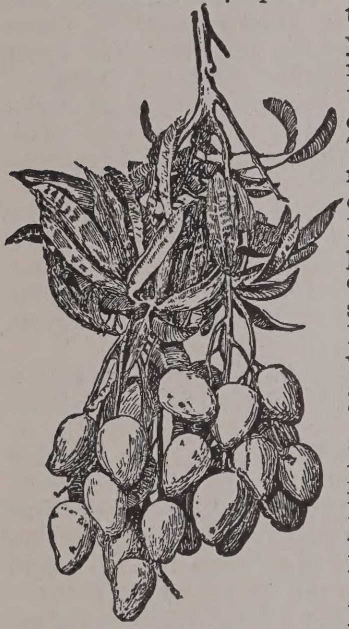
Mangaldan (*män-gäl-dän′*), a town of the Pangasinan province in Luzon Island of the Philippines, is situated on the southern shore of the Gulf of Lingayen and thirteen miles northeast of the town of Lingayen. The population is 17,100.

Mangalore (*măn-gȧ-lōr′*), a seaport and a military station, and the capital of the District of South Canara, Madras, British India, is situated on the Malabar coast of the Arabian Sea, 125 miles northwest of Calicut and 407 miles southeast of Bombay. The town is important and picturesque. It is the headquarters of the Basel Lutheran mission in India, and also the seat of a Jesuit college and a government college. There is a large trade in coffee, nuts and pepper, which are exported from Mangalore. Among its important industries are the weaving of cloth, printing, binding, ship-building, and the manufacture of tiles. Mangalore is historically famous for the determined resistance of its garrison to the army of Tippu Sahib in 1782 and 1783. The population of Mangalore is approximately 45,000.

Mangan, James Clarence, a famous Irish poet, was born in Dublin in 1803. His poems, which were edited by J. D. O'Donoghue, are spirited and of excellent quality. Literary critics give him a place of first importance among the Irish poets. He died in 1849. In addition to his verses, he wrote *German Anthology* (1845), and *The Poets and Poetry of Munster* (1849).

Manganese (*măn-gȧ-nēs′*), one of the heavy metals. It is reddish-white in color and very hard and brittle. It rusts very rapidly in the air. Pure manganese is merely a chemical curiosity, but the metal forms several important alloys. It occurs in most iron-ores and pig-irons to some extent. A kind of pig-iron, called *spiegeleisen*, contains from 12 to 20 per cent. of manganese, and a metal much richer in manganese is called ferro-manganese. These alloys are used in the manufacture of Bessemer steel and other kinds of cheap steel, for without manganese these steels could not be worked. Manganese bronze, an alloy of copper and manganese, is valuable for certain purposes Manganese occurs chiefly as carbonate and as the black oxide. The latter is important in the manufacture of chlorine gas. An artificial manganese salt, potassium permanganate, is largely used in chemical processes. Manganese gives a violet tint to glass. Hence small quantities of manganese oxide are put into glass to neutralize the green color produced by the iron that is accidentally present.

Man′go, a fruit of the genus *Mangifera*, which contains 27 species of tropical Asiatic trees. *M. Indica* yields the common mango and is cultivated throughout the tropics. The fruit is kidney-shaped, four or five inches long, with smooth, pale green to reddish skin, and a seed almost as long as the fruit, which has a rough and fibrous shell. There is a strong suggestion of turpentine about the mango; usually a taste for the fruit has to be cultivated. It has been described as tasting like a "ball of cotton soaked in turpentine and molasses." In the tropics the mango is a staple article of food during the hot months, more than 130 varieties being cultivated in India alone. In some of the poorer varieties the pulp is full of fiber. The mango is extensively cultivated in the West Indies and more sparsely in southern Florida and California. The tree is an evergreen, grows from 30 to 40 feet high, and has a wealth of foliage.

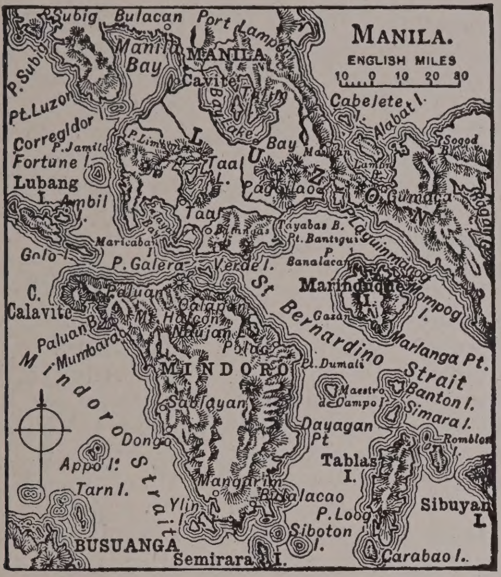

MANGO

Mangosteen (*măn̤′gô-stēn*), the fruit of a species of *Garcinia* (*G. mangostana*), a native of the East Indies. The mangosteen is one of the best, and is said to be one of the most luscious, of tropical fruits. It is about the size and shape of an orange, with thicker rind and similar pulpy segments. Its rind is purple outside, and the flavor is said to be something between a grape and a peach. It seems to be very difficult of cultivation except in the most favored situations. In the West Indies it is cultivated in Trinidad and Jamaica, but only in certain regions of these islands.

Man′grove, the ordinary name of species of *Rhizophora*, which number five or six and are widely distributed in the tropics. The commonest mangrove is *R. mangle*, and this is one of the most abundant plants of the swampy shores of tropical and subtropical seas. It is an important agent in the extension of land into the sea, by means of aerial roots which are put out from the branches and dangle in the wind until they reach the mucky soil beneath the water, where they strike root and become rigid. The seed also germinates while the fruit is still upon the tree, so that the young plantlets drop like plumb-bobs into the water and at once take root. In both of these ways the mangrove gradually advances seaward, and the detritus caught by the interwoven stems and roots presently builds up land. *R. mangle* grows along the western and eastern coasts of Florida, a round-topped bushy tree, the wood used for fuel and wharf-piles.

Manhat′tan Trade-School for Girls was founded in November, 1902, in New York City, to afford industrial education for girls from 14 years to 17 or 18. The acknowledged need of American industry is such a substitute for the old plan of apprenticeship. In Manhattan Trade-School instruction is centered to a great degree about a few of the simple and useful tools, especially the needle, foot and electric power machines, the brush and pencil as used in drawing and coloring. About these tools centers a great number of industrial occupations. Domestic service is not taught, because the field is not sufficiently inviting to girls who possess the ambition for advanced industrial education. Health and physique are carefully guarded as indispensable to industrial efficiency. There is an attempt to provide a "trade-academic course" which shall secure an education to girls to back their technical training and make for an understanding of economic conditions and the essential relations of employers and employees. Actual orders are taken and filled at market-prices. Graduates of Manhattan Trade-School are easily placed, and have been retained when other employees are being retrenched. The school rapidly outgrew its equipment, and in 1906 removed to larger premises at 209 E. 23rd St., which already are fully crowded. Manhattan Trade-School is a private venture; but it seems probable that somewhat similar industrial high-schools will shortly be provided by New York City. Boston has imitated the school by Boston Trade-School, founded in 1904.

Manila (*mȧ-nĭl′lȧ*), capital and chief town of the Philippine Islands, lies on a bay of Luzon, 650 miles southeast of Hong-Kong, with which it is joined by cable. The Pasig River divides the city into two parts. The great industry is cigar-making. The main exports are hemp, sugar, copra, cigars and leaf tobacco in the order in which they are given. Though the city is liable to earthquakes and tropical hurricanes its commerce is thriving and the population 266,943, of whom 236,940 are natives, 16,657 Chinese, 5,471 Americans and 4,406 Spaniards. Here, on May 1, 1898, during the Spanish-American War, the Spanish fleet was destroyed in the bay by the American fleet under Commodore Dewey. At the end of the war the islands were ceded to the United States by treaty on Dec. 10, 1898.


MANILA.
ENGLISH MILES
10 0 10 20 30
Subig
Bulacan
Port Lampon
P. Subig
Manila Bay
MANILA
Cavite
Pt. Luzon
Corregidor I.
P. Jamilo
Fortune I.
Lubang I.
Ambil I.
P. Limbones
Taal L.
Taal
Balayan Bay
Batangas
Bay Lake
LUZON
Cabelete I.
Alabat I.
Sogod B.
Mauban
Lamon B.
Pagbilao
Gumaca
Tayabas B.
Pt. Bantigui
Guinmaras
Maricaban I.
Golo I.
P. Galera
Verde I.
P. Banalacan
Marinduque I.
Gasan
Mompog I.
C. Calavite
Paluan
Paluan B.
M. Halcon
Calapan
Naujan
Pola
Mumbaraó
MINDORO
Pt. Dumali
St. Bernardino Strait
Marlanga Pt.
Banton I.
Simara I.
Maestro de Campo I.
Sablayan
Dayagan Pt
Romblon
Mindoro Strait
Dongon
Appo I.
Tarn I.
Tablas I.
Mangarim
Bulalacao
Ylin
P. Loog
Siboton I.
Sibuyan I.
BUSUANGA
Semirara I.
Carabao I.

Manil'a Hemp. See Rope.

Ma'nioc. See Tapioca.

Manistee (*măn'ĭs-tē'*), a city of Michigan, is on Lake Michigan, at the mouth of Manistee River and 135 miles northwest of Lansing. It is the county-seat of Manistee County, and has the service of three railroads. It also is an important shipping point, and has passenger-boat service with Chicago and other cities. The region is underlaid with a bed of salt 30 feet thick, and this gives employment to a large number of people in 10 salt-works. Manistee is noted for manufacture of sawed and planed lumber and shingles, its production of the latter surpassing, as far as known, that of any other town in the world. It has good public schools, several churches and a library. Manistee has gas-works, three foundries and a public water-supply. The town was incorporated in 1867. Its name means Spirit of the Woods. Population 13,736.

Manitoba (*măn'ĭ-tō'bȧ*) was called the prairie-province up to 1906, when Alberta and Saskatchewan, having received provincial autonomy, also shared the title. It lies near the center of North America and midway between the Atlantic and Pacific Oceans. The southern boundary is Minnesota and North Dakota. The 60th parallel is its northern boundary and it embraces a third of the western shore of Hudson's Bay.

Area. In size it is larger than Scotland, Ireland and Wales combined: it embraces 251,000 square miles of territory. Conceive the extent of its rich acres. Placing a family of five on every half section of land, there is room for 2,000,000 of a farm population.

History. The first white settlement (the Selkirk Colony) was made in 1812 on both sides of the Red River below Winnipeg, then called Fort Garry. The colonists were mostly from Scotland, and many of their descendants still reside on the old homesteads. The colony remained under Hudson Bay Company rule at Fort Garry until 1870, when the whole western country, excepting British Columbia, which already was an independent colony, passed under the control of the British government by purchase. The prairie was at that time known as Assiniboia. The price paid to the Hudson Bay Company to extinguish their title was $1,500,000, they retaining two one-mile-square sections of land in each township of 36 sections (six miles square) and small areas around their trading-posts, about one twentieth of the land all told. In 1870, when Manitoba was created a province and became a part of the Canadian federation, the boundaries were much smaller than the enlargements of 1880 and 1912 made them. Only 36 per cent. of the population is native to the province. In the early days the population was largely French and French half-breeds. When the agricultural possibilities of the country became known, there was a large immigration from the United States, Great Britain, central and northern Europe and eastern Canada.

Drainage. The fertile belts paralleling the shores of Lake Winnipeg at one time, it is thought, formed the bed of the lake. (Scientists call it Lake Agassiz.) When the lake disappeared, it left deposits of clay and silt which are now overlaid by two to four feet of black vegetable mould, constituting the most magnificent wheatlands in the known world. Through this valley Red River flows northward into Lake Winnipeg, which with Lakes Manitoba and Winnipegosis on the west (in reality parts of one whole) finds its outlet in Hudson Bay, and thus the lakes and rivers of the province drain the whole country. All Manitoba belongs to the Hudson Bay drainage-system. For this drainage the great lakes of the province are the reservoirs.. Winnipeg River is some 200 miles long. At its falls from Lake of the Woods is one of the greatest and most easily utilized water-powers in the world.

Climate. Unlike some of the other provinces, Manitoba possesses but little variety of climate. There is much sunlight the year through. This ensures rapid and successful growth of vegetation. The autumns are growth of vegetation. The autumns are long and agreeable. During the winter, on account of the dry atmosphere, the low temperature is not so much felt as in countries with more moisture.

Resources. Agriculture will always remain the chief occupation of the people. At first wheatgrowing was the chief item; mixed farming is now increasing; nearly all the wheat is sent to Europe either in the grain or as flour made in Canadian mills. Large flouring-mills are to be seen everywhere. So thickly are the railroads intersecting the province that but few farms are more than 8 or 10 miles distant from a road. There are four systems: the Canadian Pacific, the Canadian Northern, the Great Northern and the Grand Trunk Pacific, extending to Prince Rupert, B. C. Winnipeg, Brandon and Portage la Prairie are the chief centers of population. The province has 2,000,000 square miles of arable land, but only about one sixth is under cultivation.

Manitoba was the sphere of the pioneering efforts in western Canada's immigration. It is only 36 years since the province had only 17,000 inhabitants. To-day its population is more than 455,000. In 1870 its agricultural production found no place in the records. In 1881 it was credited with producing 1,000,000 bushels of wheat on 51,300 acres and 1,270,268 bushels of oats. There are now over five million acres under cultivation, more than thirty-five million in wheat, and the yield averages twenty-two bushels per acre. Wheat, noted for its firm, full kernel, and oats and barley, also of excellent quality, are the leading grain crops. Potatoes and other root crops reach an extraordinary size in the rich and mellow soil. The rains of June and the heavy summer dews which follow, supply ample moisture. Native prairie grasses furnish abundant hay. Harvest usually begins about the middle of August, and ends with September.

Water and fuel are important considerations for the settler. In Manitoba the country is everywhere at easy distances intersected by creeks and rivers, and there are many lakes, especially in the northern portion. Water can be secured almost anywhere by sinking wells to a moderate depth.

Mr. Sifton, a former minister of the interior, who has resided many years in the northwest, wrote, before the extension of Manitoba's boundaries in 1912: "In Manitoba and the two new provinces of Alberta and Saskatchewan there are, roughly speaking, over 200,000,000 acres known to be fit for cultivation, and the population at the present time is about 750,000 souls. They last year cultivated altogether about 5,250,000 acres. They produced 60,000,000 bushels of wheat, and 66,000,000 bushels of other grains. This year (1905) there will be 5,750,000 acres under cultivation. The rest awaits the plough. If 750,000 people cultivating 5,250,000 acres of land produce 126,000,000 bushels of grain, and there yet remain more than 190,000,000 acres to be brought under cultivation, is it too much to say that within a few years the grandiloquent title of the Granary of the Empire will be more than realized?"

The coalfields of the west and the timbered districts of the north and east, as well as the south, will supply fuel for hundreds of years.

Education. There is but one school-system—the public-school system under which all schools are free to all children between 5 and 15. High schools in all the cities and larger towns are free to resident pupils, and in Winnipeg and Brandon there are colleges possessing a standing equal to that of the institutions of the older provinces. Excellent training is provided for teachers, and their qualifications are of a high standard. The public schools are maintained largely by government appropriations, at present about $2,000,000 yearly. In this province, as throughout Saskatchewan and Alberta, the Dominion government has set apart two sections of land in each township, the income from which is applied to the support of its schools, the remainder of the funds being provided by a land-tax. One eighteenth of the land is set apart for school purposes. Private schools, business colleges and public libraries are numerous, as well-equipped, as those in similar communities anywhere, and are established in all the cities and towns of importance. With the splendid public schools these offer educational facilities fully equal to those of any country. In 1886 the number of schools was 422 with a school-population of 16,834. There are now over 2,000 public schools, with an attendance of 71,000. There also is a large number of Roman Catholic parochial schools. There is an experimental farm at Brandon that is doing much to educate the farming population. Accurate records of all experiments in practical work are kept, and the information is given to the settlers free. There also are dairy-schools, farmers' institutes, live-stock, fruit-growers', agricultural and horticultural associations that are doing much to educate the settlers, free of charge, in all the most successful methods of carrying on all the branches of their calling.

Man'itou'lin, a large island in Lake Huron, wholly in Canadian waters. South of the District of Algoma and northwest of Georgian Bay. Valuable for its grazing lands. Not easily accessible in winter. It is about 60 miles long and for half of its length is 15 miles wide. Its largest town is Gore Bay (population 1,000). The country across the channel to the north is rich in timber and minerals.

Man'itowoc (*măn'ĭ-tō-wŏk'*), **Wis.,** the capital of Manitowoc County, on the river of the same name, on the shores of Lake Michigan, 75 miles north of Milwaukee. It has a good harbor and a considerable lake-trade, and is served by the Chicago and Northwestern Railroad and the St. P. & S. Ste. Marie. It has ship-yards, tanneries, edged tool and agricultural implement works, aluminum and iron foundries, machine-shops, great malt houses and glue-factories. Church-furniture is made, there are canning and knitting factories, and dairying is important. Manitowoc has a county training-school for teachers, a splendid court-house, fourteen churches, an admirable school system and a Carnegie library. Population 22,000.

Mankato (*măn-kā'tō*), **Minnesota,** county-seat of Blue Earth County, is on Minnesota River, 86 miles southwest of St. Paul. A state normal school is located here, and there are good public and parochial schools, Lutheran and Catholic seminaries, two business colleges, a city hall, court house, 23 churches, a public library, 5 weekly and 3 daily papers, 6 banks, and 2 hospitals. It manufactures flour, knit goods, brick, cement, lumber, butter, concrete tiling, engines, trip hammers, road graders, creamery supplies, shirts, overalls, candy, paper boxes, lime, cigars, incubators and brooms. Near the town are valuable stone-quarries. Mankato has the service of 4 railroads and is well supplied with water power. Population, 14,000.

Mann, Horace, an American educator and reformer, was born at Franklin, Mass., May 4, 1796. He graduated at Brown University in 1819, and began to study law. As a member of the Massachusetts legislature he founded the state lunatic asylum. In 1833 he became president of the state senate. For 11 years he was secretary of the Massachusetts board of education. He subsequently abandoned politics and business and gave his whole time to the cause of education, generally working 15 hours a day. He became John Quincy Adams' successor in Congress in 1848, where he opposed the extension of slavery. He was president of Antioch College, Ohio, from 1853 till his death, Aug. 2, 1859. See his *Life* by Mrs. Mann.

Man'na, a sugary substance obtained from the manna ash-tree by making crosscuts into the stem. This tree is grown in Sicily and Calabria mainly for its sap, called manna. In July and August deep cuts are made near the base of the tree, and, if the weather is warm enough, the manna begins to ooze out of the cuts slowly and hardens into lumps or flakes. Manna is light and porous, in the form of crystals, easily broken, yellow in color and with a sweetish, somewhat bitter taste. There are several other manna-yielding plants besides the ash, as the manna-bearing eucalyptus of Australia. The manna eaten by the Hebrews in their wandering in the wilderness was what is now called Mount Sinai manna, which falls to the ground from the branches of a kind of tamarisk. It oozes out through holes made in the bark by little insects. It is not true manna, but is a kind of reddish, sticky syrup, and is eaten by the monks of Mount Sinai like honey with their bread.

Man'ning (Henry Edward), Cardinal, was born July 15, 1808, at Totteridge, Hertfordshire, England. He was educated at Oxford, and soon came to the front as an eloquent preacher and leader in the English church. In 1851 he joined the Roman church. He studied for a time at Rome, was made provost and then archbishop of Westminster. In the Vatican Council (1870) Manning favored the doctrine of the pope's infallibility, which was then declared. He was made cardinal in 1875. Besides being foremost in most Roman Catholic movements in England, he took part in many good works for bettering the social life, as the temperance movement, housing the poor, education and the rights of workingmen. A great churchman and a reformer, he also was an accomplished man of the world and scholar. Among his writings are *Characteristics, The Catholic Church and Modern Society, Four Great Evils of the Day, Temporal Power of the Pope* and *England and Christendom.* Cardinal Manning died at Westminster, Jan. 14, 1892.

Manning, William T., Protestant-Episcopal Bishop of New York, and one of the leading ecclesiastical men in the United States. Born in 1866, he was graduated from the University of the South, and became a rector at Redlands, California. Later he accepted the chair of dogmatic theology at his alma mater. In 1904 he was chosen assistant rector of Trinity Parish, New York City, rising to the rectorship in 1909. Since 1921 he has been bishop of New York. Under his leadership the great Cathedral of St. John the Divine, at New York, is being erected.

Manometer (*mȧ-nŏm'ė-tẽr*), an instrument for measuring fluid-pressures. There are three principal types of manometers. The simplest type is merely a U-tube, partially filled with mercury and open at both ends. If, now, one arm of the U-tube be connected with the vessel in which the pressure is to be measured, the level of the mercury in the other arm will change; and the difference of level between the two arms *plus* the barometric height will give the pressure in the vessel. Water is sometimes used instead of mercury. This kind of manometer is shown in Fig. 1. The *second* type of manometer is one in which a U-tube is also employed — but a U-tube with one end sealed off and inclosing a definite amount of

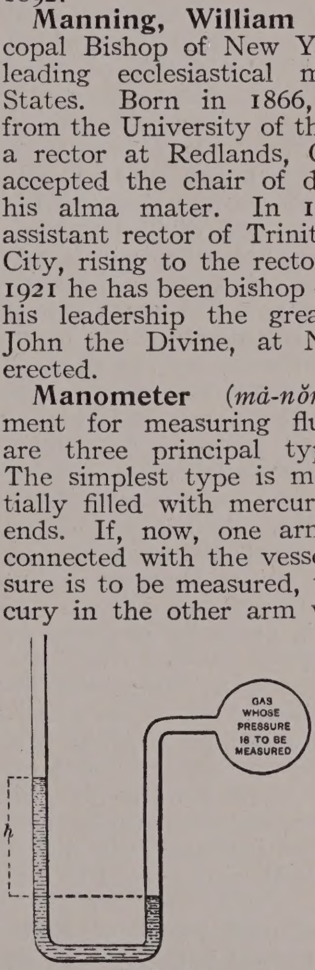
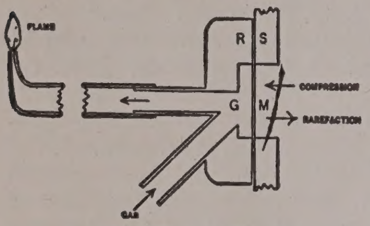


FIG. I

gas. The open end being connected with the vessel in which the pressure is to be measured, the volume of the gas inclosed in the other end is changed. By use of Boyle's law the pressure may be computed as soon as the volume of the inclosed gas is known. Lord Kelvin's deep-sea sounding apparatus is merely a manometer of this type, by which the pressure at any point in the sea is measured. From this pressure the depth of the sea is computed. A *third* type of manometer is the one commonly employed on steam-boilers and known as a *pressure-gauge.* This device consists of a flattened and curved metallic tube which changes shape as the difference of pressure between the inside and outside is changed. It was invented by Bourdon, and is frequently called a *Bourdon gauge.* (See BAROMETER.) One end of this gauge is fixed, while the other is free to move an index which shows the pressure on a graduated dial.



MANOMETRIC FLAME

Manometric (*măn'ȯ-mĕt'rik*) **Flame,** an instrument for exhibiting to the eye the disturbances which a sound produces in the air, was invented and perfected by Rudolph König of Paris. In the figure, R and S represent two blocks of wood which have been bored out. A diaphragm of goldbeater's skin is clamped between these two blocks and divides the apparatus into parts. Illuminating gas is admitted to the left-hand side of the apparatus, as indicated by the arrows, and burns with a quiet flame so long as the diaphragm is undisturbed. If, however, the air on the right of the diaphragm is suddenly compressed, the flame will flare; and if this air is suddenly rarefied, the flame will for an instant burn low. The effect of a sound-wave striking this diaphragm is then to drive it alternately forward and backward, making the flame pulsate. These acoustical disturbances are, however, so rapid that the changes in the height of the flame are not easily seen. Accordingly, the flame is generally observed in a rotating mirror, which serves to separate the images of the flame at successive instants. In practice the block, S, is generally provided with a mouthpiece or with a tube to lead the sound up to the diaphragm, M. This instrument is used to exhibit, in the most beautiful manner, the qualities of various sounds, as, for instance, the difference in the various vowels pronounced by the same voice.

Mans'field, a city, county-seat of Richland County, in the central part of Ohio, 65 miles northeast of Columbus. It is situated in the midst of a fine farming-country, on an elevated site. It has a large trade, and manufactures threshing machines, steel harrows, electrical supplies, stoves, brass goods, pumps, agricultural machinery, wagons, webbings, suspenders, cigars, boilers, carriages and flour. It was the home of Senator Sherman. The chief buildings are the Public Library, Children's Home, Y. M. C. A. and Ohio Reformatory. Mansfield has many churches, several public-school buildings and two business-colleges, and is justly proud of her school-system. Population 35,000.

Mansfield, Richard, an actor, was born on Heligoland, May 24, 1857. He first appeared as a musician in Liverpool in 1877, and for some years after that was seen only in small parts in comic operas. His first marked success was achieved in New York at the Union Square theater in January, 1883, as the Baron de Chevreul in a Parisian romance. Three years later he appeared as a star in *Prince Karl.* Later he gained a high position as an actor, managing a company of his own and appearing in a wide variety of plays. Among his successful roles were Dr. Jekyll and Mr. Hyde, Cyrano de Bergerac, Shylock, Henry V and Brutus. He died on Aug. 30, 1907.

Mantua (*măn'tū-ȧ*), a fortified city of northern Italy, formerly the capital of the duchy, is on two islands formed by the Mincio. The surrounding marshy district and its fortifications perhaps make it the strongest fortress in Italy. It has broad streets and many open squares. The fortress of the Gonzagas, adorned with paintings by Mantegna, the cathedral of San Pietro and the church of San Andrea are its chief buildings of interest. Vergil was born at a suburb of Mantua. Mantua first was an Etruscan town, then it belonged to the Romans, Ostrogoths and Lombards. The Gonzaga family became its rulers in 1328, and raised the city to its height of splendor and renown. Mantua became a part of Austria in 1708, which held it till 1866, except for two short periods when it was in the possession of France. In the latter year it was ceded to Italy. The city has had three great sieges—by Emperor Ferdinand II in 1630, the French in 1797 and the Austrians in 1799. Population 29,142.

Man'ual Training in Public Schools. In 1868 Victor Della Vos, director of the Imperial Technical School for government engineers at St. Petersburg, conceived the plan of teaching certain kinds of tool-work by means of models and drawings and practice exercises, before any attempt should be made at the execution of trade-work. The exhibition made by his school at the Centennial Exposition in Philadelphia (1876) directed the attention of American educators to a system which, it was felt, could be made of inestimable value to the young, many of whom remained in school only long enough to conceive a distaste for manual labor, but not long enough to acquire professional culture.

It was believed that these experiments opened the door to an education which combined the intellectual and physical; that both mind and body might be disciplined by processes which broadened the man, fitting him to become a useful member to the community and also a producer of wealth. It was maintained that observation, judgment and induction could be cultivated, not only in schools of philosophy and science but in schools of trade and technology. Considering that only about one sixth of the pupils entering the ordinary high school complete the course and that most of those passing through the grammar school do not enter the high school at all, it seemed that some course should be adopted which would retain the majority of young people by a combination of intellectual studies with those having an economic aspect. The result of attempting two such diverse ends has naturally given rise to rival schools, in one of which the intellectual aim prevails, in the other the economic purpose. Those private institutions which perhaps are best known are the schools connected with the Drexel Institute, Philadelphia; Washington University, St. Louis; Armour Institute, Chicago; and that under the care of Massachusetts Institute of Technology, Boston. The curriculum most favored in these institutions embraces (in mathematics) algebra, trigonometry, astronomy and mechanics; (in science) botany, chemistry and physics, with elementary lessons in biology and geology. Composition and rhetoric are not neglected, and in some schools excellent instruction is given in Latin and in modern languages. As specially distinctive of these schools, however, marked attention is paid to drawing, clay-modeling, tinting, joinery, wood-carving, forging and founding.

In the public schools the introduction of manual training has met with wide approval, until it has become a part of the curriculum both in grade and high schools. In these schools manual training includes the school-arts of writing, stick-laying, drawing, woodworking, clay-modeling, wood-carving, sewing, weaving, painting, etc. The handling of simple tools at home, as the knife, the pencil, the pen, the needle, the scissors, the hammer, anticipates the use of similar tools in the schoolroom and helps the child in the development of motor-control, as well as of manual skill; in fact, there is hardly anything that he does at his games or his work which does not serve a similar purpose. The course of study in every well-organized school gives a prominent place to some of the other school-arts as well as to writing. Their place in the education of the child is being recognized more generally in all advanced systems of education than ever before. Not only do they develop motor-control and skill in doing things, but each act reacts upon the apperceptive activities, building up clearer notions and more positive definitions. So generally is this fact realized that *thinking and doing* have become indissolubly united in scientific pedagogical conceptions. Everybody has noticed how quickly a little effort at making a picture or a model of a thing helps him to discover its essential elements and fix them in his mind. Give a child a pair of scissors and set him to work at cutting out paper-pictures and then at cutting out forms in imitation of leaves, triangles, squares, and note how it helps him to clarify his notions of their shapes, sizes and margins. Add to the above a little exercise in drawing them; then let him lay them out with splints, or sew them on cardboard; then model them in clay or soap; then let him paint them in water-colors. Test him on his ability to describe or to recognize them; and his growth will be the best argument for their use. What is true in the simple forms is even more true in the complex, thus on the purely intellectual side supporting the systematic arrangement of a variety of manual training exercises through the grades and into the high school.

The value of manual training on the artistic side is clearly enough seen in its ability to hasten the attainment of physical control and skill in mechanical execution. The average man or woman, on entering some industrial occupation, finds himself greatly handicapped by the lack of manual dexterity which should have been attained in childhood and youth, the only time when it can be attained with economy. Expert lacemakers, jewelers, engravers, seamstresses, pianists and violinists, decorators and designers, penmen and weavers are not the only people who need nimble fingers and well-trained hands for their daily work. They are demanded in every walk in life, and all systems of education should provide for their development.

The expense in the elementary grades for the materials for each of the arts named is not much more than for the materials for writing, and is not burdensome in the higher grades. For an inexpensive little book by Abbott on *Manual Training in the Grades,* from which illustrations are taken, address F. B. Abbott, publisher, Emporia, Kan. For more elaborate treatises on the whole subject see Tadd's *New Method in Education,* Love's *Industrial Education* and Goetz's *Hand and Eye Training.*

The following brief teacher's working outline in manual training for the *first grade,* exclusive of penmanship and drawing proper, will furnish a fair view of the work now being done in the best schools. Some phases are necessarily omitted on account of lack of space.

The materials needed are splints for stick-laying, wire half-circles, coated paper-squares of the six elementary colors, a few sheets of common cardboard, a few pounds of well-ground clay, a pair of scissors, a few skeins of colored worsted, a few skeins of carpet-yarn for weaving mats, a few sheets of perforated figure-papers, a few pounds of raffia for weaving baskets, a paper of large needles and six weaving-needles.

The object of stick-laying is to teach spacing, design, arrangement and orderliness. The paper-folding gives practice in the simplest hand-movements and in the use of the inch-measurement. Tracing on the back of the colored papers over the creases gives practice in precision and accuracy. Working out figures with worsted in perforated paper helps to fix forms and co-ordinates eye-pictures and finger-movements. Clay-modeling develops the idea of form and cultivates the sense of touch. The weaving serves many of these purposes and in the succeeding grades makes an excellent introduction to industrial occupations.

The course is arranged for two 15-minute periods per week; one in clay-modeling and one in stick-laying or paper-folding.

The work is planned for 23 weeks; the numbers refer to the number of week, and the letter to the lesson.

1. (*a*) After conversation on the sphere, model the sphere, using fingers only.

(*b*) Measure side of four-inch red square.

2. (*a*) Model a spherical object.

(*b*) Lay red sticks to form a border illustrating repetition.

3. (*a*) Model a spherical object.

(*b*) Measure side of four-inch orange square. Fold, making a diameter. Teach diameter. Measure distance from end of diameter to corner. Fold, forming a diameter at right angles to the first diameter. Trace on the back of paper over the creases, making a cross.

4. (*a*) Model a cube.

(*b*) Lay orange-colored sticks to illustrate repetition of twos.

5. (*a*) Model a cubical object.

(*b*) Fold a four-inch yellow square so as to form 16 one-inch squares. Measure the squares. Trace on back of paper over the creases.

6. (*a*) Model a cubical object.

(*b*) Lay yellow sticks illustrating the repetition by threes.

7. (*a*) Model an isometric cylinder.

(*b*) Fold a green square to form a diagonal. Fold to form a diagonal at right angles to the first. Make six folds parallel to one of the diagonals, making equal spaces. Trace on the back of paper over the creases.

8. (*a*) Model an isometric cylindrical object.

(*b*) Lay green sticks to illustrate alternation.

9. (*a*) Model an isometric cylindrical object.

(*b*) Fold blue square same as in lesson 7(*b*) and in addition fold six creases parallel to the other diagonal, thus forming small squares. Trace over some of the creases to make a design, which shall be symmetrical.

10. (*a*) Model a cylindrical object with rounded ends.

(*b*) Lay blue sticks to illustrate oblique alternation.

11. (*a*) Model an object like cylinder.

(*b*) Fold a violet square as in lesson 9(*b*) and trace pin-wheel design on creases.

12. (*a*) Model an object like cylinder.

(*b*) Lay violet sticks in design as a modification of 10(*b*).

13. (*a*) Model a sphere and bisect it with a string.

(*b*) Fold red square as 9(*b*) and trace symmetrical design on creases.

14. (*a*) Model a hemispherical object.

(*b*) Lay red sticks to form a Greek border.

15. (*a*) Model a hemispherical object.

(*b*) Fold a diameter in an orange square. Make six folds parallel to the first diameter. Form the same number of folds at right angles to the first set, thus making 64 quarter-inch squares. Draw a symmetrical design by tracing over the creases.

16. (*a*) Model a square prism and bisect across corners, forming a triangular prism.

(*b*) Lay orange sticks to illustrate alternation.

17. (*a*) Model a square prismatic object.

(*b*) Fold a diagonal in a yellow square and also seven creases parallel to it. Fold a set at right angles to the first. Draw symmetrical design on creases.

18. (*a*) Model a triangular prismatic object.

(*b*) Form a flag with three yellow sticks.

19. (*a*) Model a cylinder and bisect it

(*b*) Draw the diameters and diagonals on the back of a blue square. Connect the end of the diameters in such a way as to form a square. Cut on the lines with scissors, making 16 right-angled triangles.

20. (*a*) Model a hemicylindrical object.

(*b*) Make two borders using eight triangles of lesson 19(*b*) and blue sticks These may be mounted.

21. (*a*) Model a hemicylindrical object.

(*b*) Draw on back of blue square two sets of parallel lines at right angles to each other, forming 16 one inch squares. Cut with scissors.

22. (*a*) Model cylinder with rounded ends. Bisect it.

(*b*) Arrange seven squares of lesson 21(*b*) in borders.

23. (*a*) Model a hemicylindrical object.

(*b*) Make a design of blue triangles — of lesson 19(*b*) — and blue squares — of lesson 21(*b*).

The knife and a few other simple tools are introduced as the work advances, and habits of originality, accuracy, precision and speed are inculcated throughout the course. The views of specimens of work done in grades seven and eight show how the skill of the pupil develops through the years.

All of the work for the grades can be done on the ordinary school-desks, though, as a few heavier tools may be introduced in the seventh grade, benches will then be needed. In the high school the work properly differentiates into certain specific lines for the boys and for the girls. Work-benches, full sets of tools, lathes, scroll-saws etc. are needed for the heavier work for the former; sewing-tables or kitchen furniture, depending upon the direction the instruction takes, for the latter. Tables and tools in common can be used for clay-modeling, bent-iron work, wood-carving etc.

Ma'nuel (*mä'noo-al*) **II** formerly King of Portugal was born on November 15th, 1889, and became king on February 1st, 1908, in consequence of the assassination of the king and the crown-prince. The country was deeply in debt, and popular discontent resulted in a revolution, beginning October 5, 1910. Manuel fled the country, a republic was organized, and a decree of banishment passed against the royal family. The first elections were held May 28, 1911, the assembly opened June 19, and on the same day was officially recognized by the United States. Legislative authority is vested in a national Council and an upper House.

Manures' either are stable-manures or green-crop manures, *i.e.*, crops not harvested but plowed under. "Compost" sometimes refers to stable-manure in the pile, and sometimes to other farm-litter, as leaves, straw, swamp-muck and road-dust piled up to undergo a rotting process. Stable-manure is a "complete" fertilizer, *i.e.* it contains all the elements needed by plants. (See FERTILIZERS.) It is worth from $2.50 to $4.25 a ton, as reckoned by the market-value of its 10 pounds of nitrogen, 10 of potash and 5 of phosphoric acid. Mature animals return nearly all the fertilizing elements of their food, and the computed value of the waste is often nearly half the cost of the food (Roberts). But its chief value is in its effect on the physical nature of the soil, for its decay adds humus. This makes clay lighter, giving it greater water-capacity and better ventilation, and makes sand more retentive of water. The decay also brings about beneficial chemical changes in the minerals of the soil. Careful observations show that the exposed manure loses most of its valuable plant-foods by leaching and that horse-manure loses in value over $1 a ton during the summer through heating and fermentation. Stable-manure should be kept protected from rain till spread on the field. Plenty of litter or bedding should absorb valuable, liquid plant-food. Mixing the drier horse-manure with the colder manures of other stock will lessen the loss referred to. Green manuring crops are used to return to the soil not only the food taken from the top soil, but that taken from the deeper soil by the roots, with the added advantage of adding humus. Green manuring crops are most economically managed when worked in between other crops, as in the late summer and fall. The leguminous plants, being nitrogen-gathering (*q.v.*), have the double value of being deep-rooted and of adding nitrogen from the air. The most generally used nonleguminous crops for green manuring are rye, a winter crop and buckwheat, as both can use plant-food too tough for many crops, and so make it usable; wheat, oats and rape are also used. The clovers, especially red clover, are the most widely used plants for this purpose in the United States, while the cowpea (*q.v.*) is the most important in the south, being often planted after oats are harvested in the spring and in between the cotton-rows. See *Bulletins* of the U. S. Dept. of Agriculture and of state experiment-stations.

Man without a Country, The, a story published in *The Atlantic Monthly*, December, 1863, is a powerful story by Edward Everett Hale. Philip Nolan had been "as fine a young officer as there was in the Legion of the West, as the western division of our army was then called." But he was fascinated by Aaron Burr, involved in his treason, and tried. In a frenzy he cursed the United States in open court, wishing that he might never hear the name again. From this time forth Nolan was a man without a country, for the sentence of the court was that he never should hear the name *United States* more. He was sent upon long cruises, and during 20 long years never got within a hundred miles of his country. At first he is said to have shown some braggadocio; but he died repentant enough, leaving this epitaph for himself: "He loved his country as no other man has loved her; but no man deserved less at her hands."

Manzoni (*män-zō'nē*), **Alessandro,** a great Italian novelist and poet of the romantic school, was born at Milan, March 7, 1785, of a noble family. He published his first poems in 1806; sacred lyrics and two tragedies, one highly praised by Goethe, followed; but the work which gave Manzoni European fame was his historical novel, *I Promessi Sposi* or The Betrothed Lovers, a Milanese story of the 17th century, powerful and interesting from its sketches of Italian life and customs and, especially, for the account of the plague in Milan. His famous ode of *Il Cinque Maggio* or The Five Great Ones was inspired by the death of Napoleon. He died at Milan on May 22, 1873.

Map, a drawing on a plane of the surface of the earth. As the earth is a sphere, it cannot be exactly represented on a plane or level surface, and various methods have been adopted to do away with the difficulty. The arrangement of the lines of latitude and longitude in circles is the most common way, and answers the purpose fairly well. The lines of latitude are numbered north and south from the equator, and the longitude east or west of a given line, usually either Greenwich, England, or Washington in the United States. This serves to indicate the position of a country. Maps are made on a certain scale; as, one inch of the map may represent one mile of of the country. Different colors are used to mark different countries, and water, mountains, high plains and other physical features are also often indicated in the same way. The art of making maps is ancient, the Egyptians having made some rude attempts though the Greeks consider Anaximander (560 B. C.) as the pioneer map-maker. In the 15th century the revival of Ptolemy's teachings made a change in the charts made; Mercator and others among Italians and Germans made valuable contributions in the 16th century; and Sebastian Cabot made his map of the world in 1544. A topographical map represents the details of a country very minutely, as the mountains, hills, rivers and plains. A hydrographical map is one representing the waters of the world, as oceans, seas, bays, with their coasts.

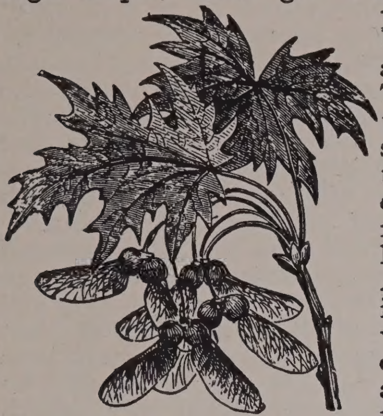
Ma'ple, a species of the genus *Acer*, being mostly trees well-known by their palmately lobed leaves and winged fruits. The genus contains about 100 species, and is distributed throughout the temperate regions of the northern hemisphere. They are among the most prized of trees for park and street planting, and nearly all of them become finely colored in autumn. The autumn colorings of the red, sugar and silver maple are especially brilliant, their red and yellow and orange of purest tones. Among the numerous well-known species are *A. saccharum*, which produces the maple-sugar and perhaps is the best and most popular of the maples for shade; and *A. saccharinum*, the silver maple, with numerous varieties, is a quick-growing tree. Other prized forms are the red or scarlet maple (*A. rubrum*), which is common for street and park planting; black maple (*A. nigrum*); Norway maple (*A platanoides*), resembling the sugar-maple somewhat and occurring in numerous garden forms; the box-elder (*A. negundo*), which is much used in the west. The sugar, hard or rock maple is a very beautiful and a very useful tree; tall and splendid, yielding the highly prized maple-sap, and its wood the most valuable of all the maples. It grows from 50 to 120 feet high, its form is dome-like, its leaves are smooth, dark green and very glossy. In autumn the leaves turn a clear, light, yellow, light red or orange, the individual tree appearing to keep year after year to almost exactly the same shade as the season before. In the spring flowers appear with the leaves greenish-yellow blossoms hanging in drooping clusters. The samara or key-fruit also is greenish-yellow and droops from a branch. The bark of old trees is a dark gray-brown and is deeply furrowed; that of young trees, smooth. The wood is extremely hard and strong, in color reddish brown, takes a high polish, is extensively used for furniture and employed for shoe-lasts and pegs. (The bird's eye and curled maple are due to peculiar conditions of the wood, undulations of the fiber). In earliest spring the sap begins to flow, and flows for about three weeks; a tree of average size will yield annually from four to eight pounds of sugar. The range of the sugar-maple is wide; it is highly valued as a shade and ornamental tree.

The silver, white or soft maple is of rapid growth and much beauty, widely planted as an ornamental tree. Its average height is about 50 feet, but it sometimes attains 120 feet. Its branches are long and inclined to drooping, its lustrous leaves are pale green above and silvery white underneath. It thrives along river-banks, is found from Maine to Florida and west to the Dakotas and Indian Territory.

The red or scarlet maple is one of the first trees to deck itself out in spring; very early, before the leaves come, it puts forth its exquisite, drooping, crimson blossoms; in the fall it is one of the first of the maples to glow in scarlet and orange; in winter its twigs turn to richest red. Spring flower, autumn leaf, winter twig and the wood all are red; the tree is well-named. The wood is used in cabinetwork, and is of special value when there is a curly grain. The tree is common in the north, growing as far down as Florida and west to the Dakotas and Texas. Its bark is dark gray; the leaves are simple, opposite and rounded; and have from three to five lobes.

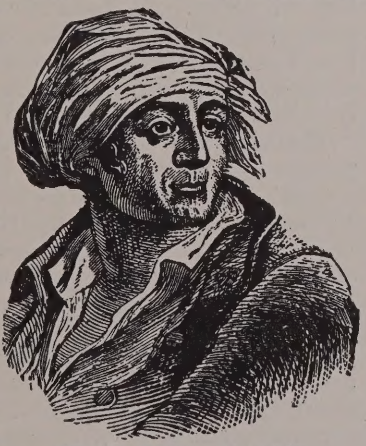
The black maple is a variety of the sugar-maple; it yields sap from which sugar is made. The bark is blackish, the underleaf downy. It is found along streams and in river-bottoms. The Norway maple is an introduced tree that has become familiar in park and by roadway. It is a handsome tree with a wealth of thin, smooth leaves, shaped like those of the sugar-maple. The box-elder or ash-leaved maple belongs by reason of its fruit, a double-winged seed, to the maples, but in manner of growth suggests both asn and elder. The foliage of vivid green adds much to its value as an ornamental tree. It is a rapid grower, but is not long-lived; its range is from Vermont and Pennsylvania southward and westward. It usually rises 30 to 50 feet; its branches are wide-spreading; and the leaf is made up of three or five irregular, coarsely-toothed leaflets. The samaras are large and a yellowish-green. See Louns berry's *Guide to the Trees* and Mathews' *Familiar Trees and Their Leaves.*

Maple-Sugar is made from the sap of the sugar-maple, which grows in the northern part of the United States and in Canada. The trees are tapped in the spring, when there are warm days and frosty nights, which help the flow. A hole is made in the trunk with an auger or ax, in which a spout is stuck through which the sap flows into a trough. It is then carried to a receiver and, after straining, to the boiler. It is boiled and refined in the same way as cane-sugar. A single tree yields from two to six pounds in a season. Good vinegar is made from it and maple-syrup, much better than sugar-molasses, which is much used on buckwheat cakes, etc. New England is the great maple-sugar region, but it is also made in Indiana, Michigan, New York, Ohio and Pennsylvania.


SUGAR-MAPLE

Maracaibo (*mä'rä-kī'bō*), **Gulf of,** a wide inlet of the Caribbean Sea, joined by a strait with the lake of the same name. The lake forms the floor of a great valley, shut in by high mountains. Its waters are sweet and deep enough for the largest vessels, but the mouth makes it difficult to enter. The gulf and lake were discovered in 1499 by Ojeda, who found here houses built on piles, and so called the region Venezuela, a Spanish diminutive meaning Little Venice.

Marat (*mä'rä'*), **Jean Paul,** one of the foremost men in the French Revolution, was born at Boudry, in Neuchâtel, Switzerland, May 24, 1744, the son of a physician. He studied medicine and practiced for a time at London. In 1788 he started his famous paper, *L'Ami du Peuple* (The Friend of the People). Throughout the Revolution he fought for his own hand, denouncing in turn Necker, Bailly, Lafayette, the king, Dumouriez and the Girondins. His paper made him hated, but made him also the darling of the scum of Paris, and placed great power in his hands. His printing-press had to be hidden from the eyes of Lafayette's police; twice he had to flee to London; and once he was forced to hide in the sewers of Paris. There is no doubt that on his head rests in great measure the guilt of the September massacres. When the republic was set up, Marat changed the name of his paper to the *Journal of the French Republic.* He was now dying of a disease caught in the sewers, and his last energies were spent in a death-struggle with the Girondins. Marat was accused by them before the tribunal, and his acquittal marked their own downfall. He was now so weak that he could only write sitting in his bath, where Charlotte Corday's knife put an end to him, July 13 1793. The beautiful Charlotte, whose lover had been killed by a mob and who said she had stabbed one man to save the lives of one hundred thousand, was guillotined, while Marat was buried with the greatest honors. See the *Histories of the French Revolution* by Mignet, Thiers, Michelet, Louis Blanc, Carlyle and Von Sybel.


JEAN PAUL MARAT

Marathon (*măr'ȧ-thŏn*), a village on the coast, 18 miles northeast of Athens, Greece. Here the Persian hordes of Darius were defeated in 490 B. C. by the Greeks under Miltiades — one of the decisive battles of the world. The Persians numbered about 110,000. Against them came 10,000 heavy-armed Athenian infantry and a small body of light-armed troops. A re-enforcement of 1,000 heavy-armed Platæans encouraged Miltiades to leave his position on the heights and attack the Persians who filled the plain below. The Greeks advanced in three bodies. The two wings carried everything before them, but the center was driven back. The wings now fell on the flanks of the Persian center and drove the whole army to their ships, which were drawn up on the beach. The Persian loss is put at 6,400; that of the Greeks at but 192. Had the Athenians been conquered, all Greece would have become a part of Persia.

Maratti (*mä-rät'tē*), **Carlo,** an Italian painter, was born near Ancona, Italy, in 1625. He studied at Rome and became a great admirer of Raphael's paintings. A picture of Constantine destroying the idols made him one of the first painters of his time. His masterpiece is the *Martyrdom of St. Biago*, at Genoa. He died at Rome, Dec. 15, 1713.

Mar'ble. In its popular sense, the term marble is applied to any crystalline rock composed principally of lime carbonate or of lime and magnesia carbonates, if it has a color which makes it desirable for decorative or monumental purposes or for building stone and a texture which renders it susceptible of polish. In origin it generally is a metamorphosed limestone. It therefore occurs chiefly in regions of metamorphic rock. Between limestone, which is not crystalline, and marble there are all gradations, and thoroughly crystalline limestone, if it is not valuable for some of the purposes mentioned above, is rarely called marble. The color of marble depends on the purity of the limestone from which it is made. If considerable quantities of materials other than lime carbonate or magnesia carbonate are present, the color depends upon the nature and distribution of these impurities in the rock. Pure marble is white, but impurities may make it red, brown, yellow, black; or, if the impurities be irregularly distributed, the marble may be mottled or clouded. Onyx or onyx marble is a variety ot marble formed by the precipitation of lime carbonate in solution, usually from the waters of springs. All limestone formed by precipitation is *travertine*, which includes stalactites, stalagmite etc., but only those varieties of travertine which have beautiful colors and are translucent are called onyx. Onyx is used for decorative purposes in the interiors of buildings. for wainscoting, lavatories etc. The onyx of ancient time was derived principally from Egypt. The principal American sources are Mexico, Lower California, southern California and Arizona. The colors of onyx are various, white, yellow and green being common. It is often mottled and beautifully veined. Certain varieties of variegated serpentinous rock are sometimes called *verd antique* marble. Marble is widely distributed, but the commercial product of the United States is derived mainly from Vermont, Georgia, New York, Tennessee, Maryland, California, Pennsylvania and Massachusetts. More than half came from Vermont. See, also, CARRARA

Mar'ble Faun, The, a romance written in the later life ot Nathaniel Hawthorne, was begun in Rome in 1859 and continued in Yorkshire, England, being finally completed in March, 1860, at Leamington. Hawthorne is said to have based some of the characters of the tale upon certain acquaintances in real life. He certainly obtained some suggestions for the situation of Miriam from the story of Beatrice Cenci. The romance was published in England under the title of *Transformation*, a shortened form of the title originally proposed, *The Transformation of the Faun.* Hawthorne was quick to see the possibilities of fun and pathos in the conception of a real mingling of fauns with men, together with the picturesqueness that might be given to their "pretty, hairy ears" and queer moral instincts in a romance of human life.

Marcel'lus, Marcus Claudius, a famous Roman general, came of a plebeian family. In his first consulship (222 B. C.) he defeated a part ot the Gauls and slew their king with his own hand. In the second Punic war he took command after the defeat at Cannæ and checked the victorious Hannibal at Nola in 216. Two years later, as consul for the second time, he blockaded Syracuse, and, helped by famine, pestilence and the treachery of the Spanish allies of the Syracusans, he entered the city in 212, and soon conquered all Sicily. In his fifth consulship (208 B. C.) he fell in a skirmish against Hannibal, near Venusia, Apulia.

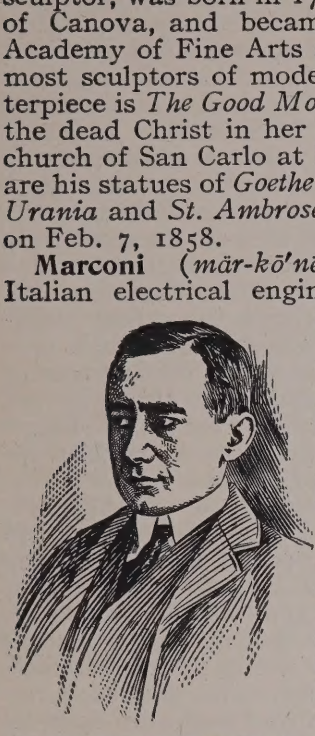
March, the third month of the year and the first in the Roman calendar, has 31 days. It was the first month in England till the change of style in 1752. Its last three days were once supposed to have been borrowed from April, and, according to an old proverb, they are always stormy. March is named after the Roman god, Mars.

March, General Peyton C., Chief-of-Staff, U. S. A. (1918–). He is a son of the late professor Francis A. March, the eminent philologist of Lafayette College at Easton, Pa., where he was born December 27, 1864. General March is known as one of the best educated and one of the best trained of our American officers. After a brilliant record in the Philippines, he became a member of the general staff (1903–7), was attached as military observer to the Japanese army in the Russo-Japanese War (*q. v.*) and when promoted to chief-of-staff, was chief of the American artillery service under General Pershing (*q. v.*) in France.

Mar'chand', Hon. Felix G., born in Quebec in 1832, was admitted a notary in 1855. He founded and for several years edited *Le Franco-Canadien*, and held from the government of France the decoration of officer of public instruction. He was the author of several dramatic pieces in prose and verse. He was provincial secretary in 1878, commissioner of crown-lands in 1879, speaker of the Legislative Assembly in 1887, and became premier in 1897, accepting the portfolio of treasurer. But few Canadians in like degree have been as successful in literary pursuits and in public affairs as well. He died in 1900.

Marchantia (*mär-kăn'tĭ-à*), a genus of plants belonging to the liverworts, whose species have prostrate and thick thallus bodies, which put out rhizoids from the under surface, and are green on the upper surface. Small cups (cupules) also are borne on the upper surface, which contain numerous disklike gemmæ for vegetative propagation. Each thallus body also sends up a conspicuous vertical branch, on the summit of which is a disk bearing the sex-organs. The disk with scalloped edge bears the male organs (antheridia), while the star-shaped disks bear the female organs (archegonia). The most common species is *M. polymorpha*, abundant on damp ground and moist cliffs. See HEPATICAE for figure.

Marchesi (*mär-kā'sē*), **Pompeo,** an Italian sculptor, was born in 1789. He was a pupil of Canova, and became professor in the Academy of Fine Arts and one of the foremost sculptors of modern Italy. His masterpiece is *The Good Mother*, the Virgin with the dead Christ in her lap, which is in the church of San Carlo at Milan. Other works are his statues of *Goethe* at Frankfort, *Venus Urania* and *St. Ambrose.* He died at Milan on Feb. 7, 1858.



GUGLIELMO MARCONI

Marconi (*mär-kō'nē*), **Guglielmo,** an Italian electrical engineer famous as the inventor of wireless telegraphy, was born near Bologna, Italy, in 1875. Even as a boy he showed a genius for experiments with electricity. He studied at the University of Bologna under the scientist Righi and also at the University of Padua. The idea of using the Hertzian waves to transmit messages appears to have occurred to Marconi in connection with his work under Professor Righi. He made successful experiments with wireless telegraphy in 1895; and, failing in negotiations with the Italian government, proceeded to England, where the value of his invention was to a degree recognized. The Wireless Telegraph Company was established in 1897. In 1899 and 1900 Marconi continued his experiments in the United States. In 1901 he succeeded in getting transatlantic messages to Newfoundland. His station was shortly afterwards removed to Cape Breton Island. The Marconi apparatus is used on British government vessels and to a large degree on American vessels. In October, 1907, a commercial service by wireless telegraphy was successfully inaugurated between Europe and America. It is not thought that the Marconi apparatus will wholly supersede the submarine cable, as the success of the former is dependent to a great degree upon suitable weather conditions.

Marc'o Po'lo. See POLO, MARCO.

Mar'cy, William Learned, an American politician, was born at Southbridge, Mass., Dec. 12, 1786. He was brought up on a farm and graduated at Brown University in 1808. He became a lawyer, but when the War of 1812 broke out he entered the army as a lieutenant. For some years he was editor of a Democratic paper at Troy, N. Y. In 1823 he was chosen comptroller of the state; in 1829 justice of the state supreme court; and two years later United States senator. In 1832 he resigned to become governor of New York and was twice re-elected. He was secretary of war in Polk's administration, which covered the era of the Mexican War. He was also of great service in the settlement of the Oregon boundary question with England. As secretary of state under Pierce, he carried on foreign affairs in a masterly manner. Throughout his public life he showed great ability as a writer, statesman and diplomatist. Marcy was the author of the famous political maxim: "To the victors belong the spoils." He died at Ballston Spa, N. Y., July 4, 1857.

Mardi Gras (*mär'dē' grä*), meaning Fat Tuesday, the day before Ash Wednesday, (the first day of Lent), the same day that was formerly celebrated in England as Shrove Tuesday. The custom of holding high carnival and making merry on that day was observed for hundreds of years in Europe and is still kept up in some of the southern cities of the United States, especially at New Orleans. It was introduced there in 1827 by Creoles who had taken part in the festival at Paris. The day is a legal holiday, and all the afternoon the streets are filled with masqueraders and balconies and windows with spectators. An ox, with its horns covered with wreaths, heads a procession of butchers. The carnival king (Rex), appears at noon, the papers having beforehand announced his landing at New York or some other port and told of his courage in war. He is represented usually as a gray-bearded, dignified man. Two pages go before him carrying his scepter and the keys of his kingdom on velvet cushions. There is also a night parade of young gentlemen maskers dressed to represent some poem, as *Lalla Rookh*, a feast, the Darwinian theory etc. The day ends with a ball, where Rex chooses his queen.

Mare Island, Cal., an important U. S. navy-yard and Federal naval establishment on the Pacific coast, about 25 miles north of San Francisco.

Maren'go, a village near Alessandria in northern Italy. Here, on June 14, 1800, Napoleon with 33,000 French defeated 30,500 Austrians under Melas. The absence of Napoleon when the fighting began came near giving the Austrians a victory. It was the cavalry charge of the younger Kellermann that decided the day, and gained upper Italy for France. The Austrian loss was 6,400, besides 3,000 prisoners; the French loss 7,000. General Desaix was among the killed.

Margaret of Anjou (*mär'gȧ-rĕt of än' zhōō'*), queen of England, wife of Henry VI and daughter of René of Anjou, titular king of Sicily and Jerusalem, was born in March, 1429. At 15 she was married to Henry, then in his 24th year. The queen soon proved herself superior to her husband in force of character and executive qualities, and the real ruler. In 1455 began the Wars of the Roses, which finally robbed Margaret of her throne and son and husband. (See ENGLAND, HENRY VI, LANCASTER and YORK.) Margaret fell into the hands of the Yorkists in 1471 and was imprisoned in the Tower until ransomed by Louis XI of France. Margaret sought refuge in France and died on Aug. 25, 1482, having spent 20 years in war and four in prison.

Margaret of Navarre (*nä-vär′*), sister of Francis I of France, was born at Angouleme, April 11, 1492. She was carefully taught and very early became popular because of her charm of manner and strength of mind. After the death of her first husband she married Henri of Navarre, and so became the grandmother of Henry IV. She encouraged farming, arts and learning, and courageously sheltered reformers like Marot and Bonaventure. Her writings include interesting letters, poems called *The Marguerites of the Marguerite* and the noted *Heptameron*, stories modeled on the *Decameron* of Boccaccio, which most scholars believe to be the joint work of Margaret, Bonaventure and other men. See the *Life* by Miss Freer and her *Letters*. She died at Bigorre on Dec. 21,1549.

Margaret, queen of Denmark, Norway and Sweden, was the daughter of Waldemar IV of Denmark and wife of Haakon VI of Norway. She was born in 1353. By the death of her father she became regent of Denmark in the name of her son, who soon died, and then of her grandnephew Eric of Pomerania. The death of her husband made her ruler of Norway (1388), and the dissatisfied subjects of Albert, king of Sweden, asked her to take that country too. She sent an army into Sweden which took Albert and his son prisoners. Sweden was wholly conquered, and in 1397 the famous union of Kalmar was agreed upon, whereby the three kingdoms were to stay forever at peace under one king, though each was to keep its own laws and customs. Margaret also got possession of Lapland and part of Finland. She was a woman of great energy and strong will, and ruled with a firm hand. She has been called the Semiramis of the North. She died on Oct. 28, 1412.

Maria Louisa (*mä′rē′lōō-ēz′*), empress of the French, second wife of Napoleon I, was the daughter of Emperor Francis I of Austria. She was born on Dec. 12, 1791, and married Napoleon, after the divorce of Josephine, on April 2, 1810. She bore a son to the emperor on March 20, 1811, who was called king of Rome. At the beginning of the campaign of 1813 she was appointed by the emperor regent during his absence, but with many restrictions upon her authority. After the overthrow of Napoleon she made Schönbrunn her home, where she remained until 1816. She received, by the peace of Paris, the duchies of Parma, Piacenza and Guastalla. After the death of Napoleon she married Count Neipperg. She died at Vienna on Dec. 17, 1847.

Maria Theresa (*ma-rē′ä te-rē′sä*), empress of Austria, was the daughter of Charles VI, and was born at Vienna, May 13, 1717. Her father got the powers of Europe to sign the pragmatic sanction which gave the right of succession to the throne to the women as well as the men of the royal line. When she came to the throne in 1740, she found the government without money, the people discontented and the army weak; while Prussia, Bavaria, Saxony and Sardinia put forward claims to all or parts of her dominions. Frederick the Great poured his armies into Silesia; Spain laid hands on Austrian Italy; and the Bavarians invaded Bohemia and threatened Vienna. The young queen was saved by the chivalrous faithfulness of the Hungarians, to whose loyalty she appealed with her baby son in her arms, and by her own courage and energy. The War of the Austrian Succession ended with the peace of Aix-la-Chapelle in 1748, by which Maria lost territory to Prussia, Spain and Sardinia, but had her rights recognized and also those of her husband, Francis, grand-duke of Tuscany who was crowned emperor. In the years of peace that followed she fostered farming, manufactures and trade, nearly doubled the national revenues and at the same time lessened the taxes and strengthened her armies. But the loss of Silesia rankled, and she began the Seven Years' War with Frederick the Great, which only served to strengthen his hold on the lost province. She then endeavored to strengthen the country in every way, bettered the condition of the peasants, ameliorated criminal punishments, and founded schools and charitable societies. By the first partition of Poland she got Galicia and Lodomeria and obtained Bukowina from Turkey. Maria Theresa was majestic and winning, and had the undaunted spirit of a true queen. She won the love of her subjects and raised Austria from a wretched condition to power. She died at Vienna on Nov. 29, 1780. See *Maria Theresa and Frederick the Great* by the Duc de Broglie and narratives of the Seven Years' War.

Mar′iazell′, a famous place of pilgrimage in Austria, is in Styria, 60 miles southwest of Vienna. The image of the Virgin, which draws thousands of pilgrims yearly, is enshrined in a magnificent church, built in 1644.

Marie Antoinette (*mä′rē′än′twä′net′*), **Josephe Jeanne,** the most ill-fated of the queens of France, was the fourth daughter of Maria Theresa of Austria, and was born at Vienna, Nov. 2, 1755. She was married to Louis XVI, then the dauphin, in 1770. A mere child in years, neglected by her young husband and bored by the stiff etiquette of the court, she spent money recklessly, went on night drives to Paris, appeared at masked balls and became passionately fond of the card-table. When she became queen (1774), her open favoring of Austrian interests and her enmity to Turgot and Necker and their measures for stopping the distress of the country made her distrusted and disliked. The people came to think that their miseries were wholly caused by the extravagance of The Austrian, as she was called. She was also attacked in pamphlets under the names of Madame Deficit and Madame Veto. The joyous girl had become a courageous and obstinate woman, who forced the king into a backward policy, to his undoing. As Mirabeau said, the only man the king had about him was his wife. Amid the horrors of the march of women to Versailles she alone did not lose heart, and she showed herself on the balcony to the raging mob with a cool bravery that for a moment overawed the fiercest into respect. But she was a Royalist to the core, disliked liberal noblemen like Lafayette and Mirabeau, and utterly failed to understand the troublous times into which she was flung. The death of Mirabeau (1791) took away the last hope of saving the monarchy, and less than three months later took place the fatal flight to the frontier which was stopped at Varennes. Quickly followed the storming of the Tuileries the transference to the Temple and the trial and execution of the king. Then Marie's son was torn from her arms, and she herself sent to the Conciergerie like a common criminal. After eight weeks more of insult and brutality, Widow Capet, as she was styled, was herself tried in her ragged dress and gray hair before the revolutionary tribunal. With calmness she went through the two days and nights of questioning, was sentenced, and on the same day at Paris on Oct. 16, 1793, perished under the ax of the guillotine, just 23 years after she had left Vienna, a beautiful girl. See the histories of the French Revolution by Thiers, Mignet, Michelet, Louis Blanc, Carlyle and Von Sybel; and Lord Ronald Gower's *Last Days of Marie Antoinette.*

Ma'riet'ta, a city of Ohio, capital of Washington County, on the Ohio River, at the mouth of the Muskingum, 95 miles southeast of Columbus. Founded in 1788, largely by officers of the Revolutionary War, it is the oldest town in the state and the first settlement in the Northwest Territory. Remarkable traces of the early moundbuilders are visible here It is the [illegible] of Marietta College founded in 1835, and having 33 professors and instructors, 258 students and a library of 60,000 volumes. Its manufactures include the largest chair-factory in the state. The discovery and development of rich deposits of petroleum in the surrounding region have greatly stimulated the growth of the city in recent years. Population 18,000.

Marigold (*măr'ĭ-gōld*), a name given to certain plants of the same order as the chrysanthemum and dandelion. Pot marigold, *Calendula officinalis*, the common garden flower, is a native of France and southern Europe. It grows on an upright stem from one to two feet in height, the flowers, of orange and of lemon yellow, being of purest color. The plant blooms very freely; if the blossoms are kept plucked, it will flower from June to November. Seeds germinate quickly. The flowers are sometimes used in flavoring soup and in coloring cheese. Corn marigold is a chrysanthemum. The marigold is the floral emblem of constancy

Marine' Corps or marines, troops serving in the navy, whether at naval stations or on board ships, are chiefly of value when it is desired to land a fighting force, without weakening the strength of a ship's company by depriving her of part or whole of her crew In ancient times such troops by their mere presence transformed a merchant-vessel into a warship. But as cannon came to be used, men-at-arms were no longer of such value on board ships, as the defeat of the Spanish Armada did much to show. Modern marines, to use small arms, were perhaps first employed in 1653 by Admiral Blake of England against the Dutch. The American marine corps was authorized by Congress in 1775, when it was voted that two battalions of marines should be enlisted. This was actually done in 1776. Among the ordinary duties which fall to the lot of the marine guard, the most important is naval police-duty. The United States at the present time has some 8,000 enlisted marines. The marine corps is essentially "amphibious;" but it is governed by the navy regulations, except when detached by order of the president to serve with the army.

Marinette (*măr'ĭ-nĕt'*), a town in Wisconsin at the mouth of the Menominee. It contains iron-foundries, sawmills and planing-mills, and its chief industry is lumbering. Population 14,610.

Mario (*mä'rē-ō*). **Giuseppe,** a famous Italian opera-singer, was born at Cagliari in 1812, and was the son of General di Candia. In 1838 he made his first appearance in opera as Robert in *Robert le Diable*. In this he achieved the first of many successes in Paris, London, St. Petersburg and America. He was generous and always ready to help struggling artists. Mario married Giulia Grisi, the famous singer, and retired from the stage in 1867. He died on Dec. 11, 1883. See Engel's *Musical Celebrities*.

Mar'ion, Francis, was born at Winyaw, S. C., in 1732. Marion came of a Huguenot family, had little schooling, and in 1759 served in a cavalry troop commanded by one of his six brothers in an expedition against the Cherokees. At the outbreak of the Revolutionary War he was a member of South Carolina's assembly. As captain of a company he served in a successful attack on Fort Johnson at Charleston. In 1777, with but 600 men, he vainly tried to defend Georgia from the British. In 1779 he was intrusted with the command of Fort Moultrie. During the siege of Charleston he accidentally broke his leg and was carried out of the city with the other wounded. As he grew better, he gathered his neighbors about him. and gradually built up the brigade that afterward became so famous. Colonel Marion's small and ragged regiment was rather looked down upon by General Gates, when it marched into camp. But when Gates was defeated at Camden, Marion, who had been sent to destroy the boats on the rivers, rescued the American prisoners. Marion's brigade now began those marches, forages and surprises, which crippled the enemy severely. His main camp was at Snow's Island, hid among impassable swamps; but he had hiding-places in almost every Carolina marsh. He cheerfully slept without a blanket and marched without a hat. It is said that a British officer, sent to ask an exchange of prisoners, was led blindfolded into the "Swamp Fox's" camp. General Marion invited him to dinner, and the officer was surprised to find the meal made wholly of sweet potatoes roasted in the ashes and served on a piece of bark, and of a drink made of vinegar and water. The officer, on going back to the army, threw up his commission, saying he could not fight against men whose patriotism went to such lengths. After the war Marion was a member of the state senate and helped to frame Carolina's constitution. He died near Eutaw, S. C., Feb. 28, 1795. See *Life* by Horry, by Weems and by Simms.

Marion, Ind., a thriving city and important railroad center, the capital of Grant County, northeastern central Indiana, 66 miles northeast of Indianapolis. It is the seat of a national soldiers' home, a normal college and high schools, and has many manufacturing establishments, including malleable-iron works, rolling and flour mills and glass factories. In the past decade it has doubled its population, its present inhabitants numbering 24,000.

Marion, Ohio, city, county-seat of Marion County, about 45 miles north of Columbus. It is situated in a fertile agricultural region, and in the vicinity is considerable limestone. Among the extensive industries are steam-shovel works, lime-kilns and quarries, foundries, silk-mills and the manufacture of engines and threshers, agricultural implements, wood-pulleys buggies and carriages. Marion has good public and parochial schools, a Home for Aged Women and several churches, and is served by four railroads. Population 35,000

Marius (*mā'rĭ-ŭs*), **Gaius,** a famous Roman general, who was seven times consul, was born of an unknown family at Arpinum, Italy, 157 B. C. In 119 he was made tribune, and became popular for his vigor against the nobles. After marrying Julia, aunt of the great Cæsar, he served in Africa during the war against Jugurtha. After a year as consul he successfully finished the war in 106. But now began his jealousy of Sulla, his lieutenant. In 104–101 he was chosen consul again, as it was felt that Marius alone could save Rome from the Cimbri and Teutones who had burst into Gaul and slaughtered several bodies of Roman troops. The war lasted two years, but finally the Teutons were blotted out. When, besides this success, he had overthrown the Cimbri and Rudii, the Romans were wild with joy, called him the savior of the state, and made him consul for the sixth time. This was the height of his power. His jealousy of Sulla, who had been given charge of the war against Mithradates, brought civil war in 88. Marius was soon forced to flee. During his flight one of his hiding-places was discovered, and he was flung into prison at Minturnæ. Here, when a Cimbrian slave was sent to kill him, "Wretch, darest thou slay Gaius Marius?" said the old hero. The slave fled in terror, saying: "I cannot kill Marius;" and the citizens, looking on it as an omen, allowed the exile to escape. When his friends rose under Cinna, he hurried back to Italy, and the two generals marched on Rome, which was forced to yield. In revenge against the aristocracy Marius let loose 4,000 slaves, who kept up their work of murder for five days and nights. Marius and Cinna were chosen consuls in 86, but Marius had only held office 17 days when he died. See Michelet's *Roman Republic;* Mommsen's *History of the Roman Republic;* Sewall's *Child's History of Rome* and Yonge's *Young Folks' History of Rome.*

Marjoram (*mär'jō-ram*), a class of plants of which several kinds are common, as pot and sweet herbs in gardens. The common marjoram is a native of Great Britain, and is sweet-smelling, with a bitter taste. The dry leaves are sometimes used instead of tea. The plant-tops are used as a purple dye for woolen cloth. Oil of marjoram is also distilled from the plant. Pot, knotted and winter-sweet marjoram are other varieties.

Marjorie (*măr'jo-ry*) **Fleming,** a little Scotch girl, made immortal by the pen of the Scottish writer, Dr. John Brown, of Edinburgh. She was born at Edinburgh, Jan. 15, 1803. She was very bright and precocious, writing poetry, reading Swift, Pope, Gray, Newton *On the Prophecies* and *Tom Jones*, and reciting Shakespeare by the hour. She died on Dec. 19, 1811, when only eight. The beautiful story of her short life is now an English classic, and can be found in the second series of *Spare Hours* by Dr. John Brown.

Mark, called **John,** is held to be the author of the second Gospel. Of Mary his mother nothing is known, except that her house in Jerusalem was visited by Peter and the other disciples. By some Mark is thought to be the young man mentioned in *Mark xiv: 51* and *52*. Mark went with Paul and Barnabas on their first missionary journey from Antioch in Syria as far as Perga in Pamphylia; here he quitted them, why, we know not; but his leaving led Paul to refuse to take him along on his second journey, and this refusal caused Barnabas to part company with Paul. Paul seems afterward to have been his friend, and refers to him as a useful fellow-worker. Of the remainder of his life we know nothing certain. He is thought to have been Peter's companion at Babylon or at Rome. In the art of the middle ages Mark is represented by a lion. Mark's *Gospel* was written about 70 A. D., and is probably based on Peter's memory of his Master and of scenes he had himself passed through. It is pretty certain that the evangel of Mark was the first Gospel to be written.

Mark An'tony. See Antony, Mark.

Mark'ham, Edwin, a poet and lecturer born in Oregon City, Oregon, in 1852, passed his boyhood in farmwork, herding, shoeing horses and ploughing; and was a student afterwards at San José Normal School and Santa Rosa College. He became a teacher in California, and afterwards a school-superintendent. His poems and stories attracted attention, the best known perhaps being *The Man With the Hoe*. Among his other works may be mentioned *Lincoln and Other Poems; Field Folk, Interpretations of Millet; The End of the Century; Lincoln the Great Commoner; The Muse of Brotherhood; The Mighty Hundred Years;* and *The Social Conscience*.

Mark Twain. See Clemens, Samuel L.

Marl, a natural mixture of clay and carbonate of lime. The proportion of lime varies from 6 to 20 per cent. Marly soils usually are very rich, and marl has been used as a fertilizer from very early times. An English law of 1225 gave every man the right to sink a marl-pit on his own ground.

Marlboro (*märl'bŭr-ō*), **Mass.,** a city in western Middlesex County, 15 miles east of Worcester and 28 miles west from Boston. It is on the Fitchburg and New York, New Haven and Hartford railroads and surrounded by a productive fruit-growing region. It has numerous manufacturing industries, among which are the making of miners' lamps, machine-shop products, boxes, shoe-making machinery, and boots and shoes. Marlboro has an excellent city hall, soldiers' monument, state armory, public library, banks, schools and churches. The town was settled in 1656, and incorporated in 1660. It became a city in 1910. Population, 15,127.

Marlborough (*märl'bŭr-ō*), **John Churchill,** Duke of, the ablest general of his time, was born on June 24, 1650, at Ashe, Devonshire, England. His father had been made poor by his friendship for Charles I, and young Churchill had little schooling. As captain of a company of grenadiers he was sent to help Turenne to capture the fortresses on the Dutch frontier. Here his brilliant courage and ability gained him a colonelcy. His rise was further aided by his marriage with Sarah Jennings, a woman as remarkable for talent and strong will as for beauty. On the accession of James II Churchill was made a baron and general, and took a leading part in putting down Monmouth's rebellion. On the landing of the Prince of Orange he stole away to the side of the invader, and was rewarded for his treachery by being made Earl of Marlborough. He was of great service to William III in conquering Ireland and as commander against the French in the Netherlands; but was not wholly trusted by the king. On an untrue suspicion of being concerned in a plot he was imprisoned in the Tower, and was not given any public office for five years. When Queen Anne came to the throne (1702), he was given command of the British army in the Netherlands During the War of the Spanish Succession he showed his unrivaled generalship in carrying on some of the greatest campaigns of English history. Anne showered honors and offices on Marlborough and his wife. Marlborough, in fact, became regent in all but name. In 1702, as commander of the Dutch and English forces, he drove the French out of Spanish Guelders. In 1704, with Prince Eugene of Savoy, he routed the French and Bavarians at Donauwörth, and on August 13th won the great victory of Blenheim. This battle stamped Marlborough as the first general in Europe, and the queen and the emperor vied in honoring the conqueror. In 1706 the duke renewed that career of victory which broke the spell surrounding the great power of France under Louis XIV, who gloried in calling himself The Invincible. On May 23, 1706, the battle of Ramillies was fought, which obliged the French to leave the whole of Spanish Flanders. In 1708 their attempt to recover this lost ground led to the battle of Oudenarde, fought July 11th, which resulted in utter defeat for the French. The surrender of Lille and Ghent ended the campaign. In 1709 was fought the battle of Malplaquet, as Marlborough himself said, "a very murdering battle." The slaughter was tremendous, the casualities reaching 20,000 on the side of the allies and 8,000 on that of the French. The last campaign was in 1711, and when town after town had been taken from the French, the treaty of Utrecht gave 30 years' peace to Europe. Meanwhile the queen, tired of the tyranny of the duchess who had ruled her as a child, threw off the yoke. The charge of having embezzled public money was brought against the duke, and he was stripped of all his offices till George I came to the throne in 1714, when, in a day, he was again placed where he had stood after the battle of Blenheim. He died near Windsor, June 16, 1722. See Coxe's *Memoirs*, Saintsbury's *Life* and Thackeray's *Henry Esmond*.

Marlitt (*mär'lit*), **E.** (*nom de plume* of Eugénie John), novelist, was born at Arnstadt, Germany, Dec. 25, 1825. She began life as a public singer, but, losing her voice soon after, for some years she lived as companion to the Princess of Schwarzburg-Sonderhausen, who had in earlier life assisted her. In 1863 she began the publication of those serial novels which made her famous, writing for *Die Gartenlaube*, an illustrated journal. Her best-known works are *Gold Else; Das Geheimniss der Alten Mamsell* (translated and published as *The Old Ma'mselle's Secret*) *Reichs-gräfin Gisela* (Countess Gisela); *Die Zweite Frau* (The Second Wife); *Im Hause des Kommerzienrats;* and *Die Frau mit den Karfunkelsteinen*. Her style was clever, popular and eminently successful in winning many readers, although her works were severely criticised by those usually accepted as authorities in literature. She died on June 22, 1887.

Marlowe (*mär'lō*), **Christopher,** the greatest English dramatist before Shakespeare, was a shoemaker's son, and was baptized at Canterbury, Feb. 26, 1563 or 1564. He studied at King's School, Canterbury, and at Cambridge. The earliest of his plays that we still have is *Tamburlaine the Great*, which was probably played in 1590 In spite of its bombast it is far ahead of any tragedy that had yet appeared on the English stage. It is in blank verse, of which Marlowe was the first to discover the strength and variety. Soon after was played *The Tragical History of Doctor Faustus*. Other playwrights have made additions, but parts show Marlowe's genius at its height, especially in the description of Helen's beauty. *Edward II*, authorized to be played about 1593, is the ripest of his plays. It has not the fine poetry of *Faustus* and the first two acts of *The Jew of Malta*, but is better planned and more complete. *Edward II* is fully equal to Shakespeare's *Richard III*. Charles Lamb said: "The death-scene of Marlowe's king moves pity and terror beyond any scene, ancient or modern, with which I am acquainted." There seems no doubt that Marlowe had a hand in the three parts of *Henry VI* and, probably, in *Titus Andronicus*. His beautiful poem, *Hero and Leander*, was left unfinished. Shakespeare in *As You Like It* quoted the line: "Who ever loved that loved not at first sight?" and the watermen, too, sang couplets as they sculled the Thames. At Deptford, on June 1, 1593, Marlowe met a violent death in a quarrel with a serving-man.

Marlowe, Julia, a distinguished American actress, prominent especially in Shakesperian roles, was born at Caldbeck, Cumberland, England, in 1870, and came with her parents to America in 1875. She played with a juvenile company at the early age of 12. Her real name is Sarah Frances Frost; but she was known on the stage for a time as Frances Brough. After the age of 16 she studied seriously for three years for the stage in New York. In Boston she won recognition in 1888 as a star in the part of Parthenia in *Ingomar*. She has since become a great favorite in such parts as Rosalind in *As You Like It* and Viola in *Twelfth Night*. She played as joint star with Sothern during several seasons, including an English season in 1906–07. She was married in 1894 to Robert Taber; but secured a separation, and in 1899 a divorce followed. Miss Marlowe possesses great charm of manner and variety in the expression of histrionic moods.

Mar'mion, Lord, the hero of Scott's romance of *Marmion*, is a messenger who has been sent from the English court to James IV, the warrior-king of Scotland. Lord Marmion arrives in time to see the battle of Flodden Field. He is guided by a pilgrim De Wilton, who was thought to have met his death at Marmion's hand. Lord Marmion himself meets his death at Flodden; but De Wilton's love and fate are more happy. The description of the battle is told in the forceful if rugged meter which Scott affected; and, from the point of view of clearness of detail and spirited appreciation is one of the masterpieces of battle-poetry. The poem was written in 1808.

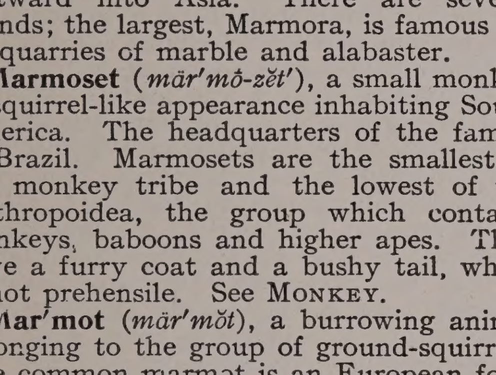
Marmont (*mär'môn'*), **Auguste Frederic Louis Viesse de,** was born at Châtillon-sur-Seine, France, July 20, 1774. He entered the army when quite young and met Napoleon at Toulon. He commanded Napoleon's artillery at Marengo, after which he became general of division. In 1805 he defeated the Russians at Castelnuova and was made duke of Ragusa. In 1809 he won the battle of Znaim and was made a marshal. He was defeated by Wellington at Salamanca. In 1813 he commanded a corps at Lützen, Bautzen and Dresden, but in the beginning of 1814 was forced to make a truce with Barclay de Tolly, which obliged Napoleon to give up his throne.

For this the Bonapartists called him a traitor. He took no further part in affairs till the Revolution of 1830, when at the head of a body of troops he tried to capture Paris, and with the few battalions that remained faithful to the royalist cause he carried Charles X across the frontier. He died at Venice, March 2, 1852, the last of the marshals of the first empire. His *Mémoires* have been published.

Marmora (*mär′mō̆-rȧ*), **Sea of,** called the Propontis in early times, separates European from Asiatic Turkey and joins the Ægean Sea by the Dardanelles (formerly the Hellespont) with the Black Sea by the Bosporus. It is an oval 175 miles long and 50 broad. It covers 4,499 square miles, and its greatest depth is 4,250 feet. The Gulf of Ismid reaches about 30 miles eastward into Asia. There are several islands; the largest, Marmora, is famous for its quarries of marble and alabaster.

Marmoset (*mär′mō̆-zĕt′*), a small monkey of squirrel-like appearance inhabiting South America. The headquarters of the family is Brazil. Marmosets are the smallest of the monkey tribe and the lowest of the Anthropoidea, the group which contains monkeys, baboons and higher apes. They have a furry coat and a bushy tail, which is not prehensile. See MONKEY.

Mar′mot (*mär′mŏt*), a burrowing animal belonging to the group of ground-squirrels. The common marmot is an European form inhabiting the Alps, Pyrenees and other more northern mountains. The groundhogs or woodchucks, so generally distributed in the United States and Canada, belong to the group. They are the largest and heaviest animals of the squirrel family. They are about two feet long and covered with long coarse hair. Their ears are small, and their tails short and bushy. When numerous, woodchucks are a great pest, eating nearly everything green and being difficult to exterminate. There are three species in North America — the ground hog proper, the yellow-bellied marmot of the Rocky Mountains and the large, hoary marmot further north. The prairie-dogs also are marmots. See PRAIRIE-DOG.


ALPINE MARMOT

Maroons (*mȧ-rōōn′z*), the name formerly applied in Jamaica and Guiana to escaped negro slaves. When the British won Jamaica from the Spaniards in 1655, many slaves fled to the mountains. They and their descendants kept up a protracted warfare with the colonists for 140 years; but in 1795 they were conquered and part of them taken to Nova Scotia and, afterward, to Sierra Leone. The Maroons of Guiana, who are generally called bush-negroes, about 4,000 altogether, form a number of independent bodies. See Dallas' *History of the Maroons.*

Marque (*märk*) **and Repris′al, Letters of,** are commissions which may be granted by a state in time of war to vessels which are the property of private individuals, giving them authority to wage war upon the enemy. The origin of the term *marque* is variously attributed to the fact that permission is given to wage war beyond the *march, mark* or border; and to the French term *lettres de marque*, meaning stamped or marked letters. Vessels sailing under letters of marque are known as privateers. The practice is now discouraged by international law, but not prohibited. Privateers are objectionable because their actions scarcely affect the naval situation, since their operations are directed solely against helpless merchantmen; they therefore do much damage to little purpose. They also are objectionable because of the reckless and often criminal character of their crews and their tendency towards sheer piracy. The War of 1812 between America and England illustrated the mischievous practice of issuing promiscuous letters of marque.

Marquesas (*mär-kā′säs*) **Islands** are a group in Polynesia (the southern Pacific) belonging to France. This group includes four or five islands discovered by Mendana in 1595 and the Washington group of seven islands discovered by Ingraham in 1797. The Marquesas cover 480 square miles, and are volcanic. In the time of Captain Cook the natives numbered 100,000; by 1838 there were but 20,000; and now there are only some 4,300. They perhaps are the finest race of brown Polynesians, courteous but cruel and revengeful.

Marquette (*mär′kĕt′*), **Jacques,** a French explorer and missionary in America, was born at Laon in 1637. When 17 he became a Jesuit, and in 1666 was sent to Canada. He studied some of the Indian languages in the neighborhood of Three Rivers, and founded the mission at Sault Ste. Marie. He next preached among the Hurons and Ottawas, and, when they were scattered by the Sioux, followed them to Mackinaw, where he built a chapel. He had heard of the Mississippi from the Indians, and in 1673 was sent to explore it by Frontenac, the governor of Canada, together with Louis Joliet. With five other Frenchmen they left Mackinaw in two canoes on May 17, and reached the Mississippi on June 17, by way of Green Bay, Fox River and a short portage to the Wisconsin. Near the mouth of the Ohio they found Europeans and were told by the Indians that it was not more than ten days' journey to the sea. They then went as far as an Indian village, probably near the mouth of the Arkansas, and now felt sure that they were not more than two or three days' journey from the mouth. They also were certain that the river emptied into the Gulf of Mexico, not, as had been thought, in Virginia or California. Not wishing to be captured by the Spaniards, they pointed their canoes upstream. They reached Mackinaw by way of the Illinois in September, having covered a distance of 2,500 miles. On the way back Père Marquette had promised the Kaskaskia Indians to come and preach to them, and after a year's sickness he set out for their country in October, 1674. Sickness forced him, however, to winter on the Chicago, and he did not reach the Indian village till the spring of 1675. He had hardly begun his mission when he became certain he could not live much longer, and set out to go back. He only got as far as the little river flowing into Lake Michigan, which bears his name, where he died. The story of his voyage and missionary journeys is told in Shea's *Discovery and Exploration of the Mississippi Valley.*

Marquette, a town in Marquette County, Michigan, is situated 420 miles north of Chicago on the southern shore of Lake Superior. Iron-ore is mined and shipped in great quantities, besides being used in its furnaces and foundries. It also has sawmills, machine-shops and a slate-quarry. It is the seat of a Catholic bishopric. Population 13,000

Marryat (*măr'rĭ-ăt*), **Frederick,** English novelist and captain in the navy, was born in Westminster on July 10, 1792. In 1806 he went to sea as midshipman under the famous Captain (Lord) Cochrane. He saw active and dangerous service off France and Spain and on the Mediterranean, and rose to be a commander when but 23. He gave up the command of the 28-gun frigate, *Ariadne*, in 1830, and the remainder of his life was spent as a writer. In 1837 Marryat made a tour of the United States and stayed two years. As a writer of sea-stories he has no superior. Aside from Dickens, no English novelist has awakened heartier and more honest laughter. His books became immensely popular as soon as they appeared, and will always be the delight of boyhood. *Mr. Midshipman Easy*, *Jacob Faithful*, *Frank Mildmay*, *Peter Simple* and *The Phantom Ship* are perhaps the best. Marryat died from overwork at Langham, Norfolk, Aug. 9 1848. See *Life and Letters* by Florence Marryat, his daughter.

Mars, the war-god of the Romans, is identified with Ares, the war-god of the Greeks. He was regarded as the father of the Romans, through Romulus, and was worshipped by them with great honor. To the Romans he was a god of nature and fertility, as well as of the vigor of war. Thus March (Lat. *Martius*), the beginning of spring, is given his name. But the Greeks thought of Mars as a sender of war and pestilence, a quarrelsome, unlovely god. He was not widely worshipped in Greece; although the Areopagus, the sacred hill of Athens, was named from Ares. The Romans had a spear and shield as emblems of Mars, said to have fallen from heaven; and the woodpecker and the wolf also were symbols held characteristic of the god.

Mars. See PLANETS.

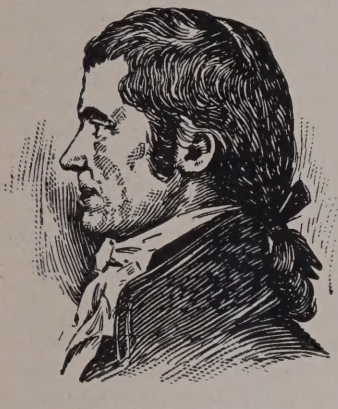
Marseillaise (*mär'sā'yāz'*) **La,** the stirring song or hymn of the French republicans, was written in 1792 by Rouget de Lisle, a young officer then stationed at Strassburg. He composed both words and music one night in April, after dining with the mayor of the city. He called it a Song of the Army of the Rhine. It was quickly carried by the revolutionists to the chief cities. It was brought to Paris by the volunteers of Marseilles, who sang it as they entered the city and when they marched on the Tuileries. So the Parisians called it *La Marseillaise.* Forbidden to be sung during the restoration and the second empire, it again became the national hymn on the outbreak of the Franco-Prussian War.

Marseilles (*mär-sālz'*), the second city of France, is situated on the Mediterranean about 27 miles east of the mouth of the Rhône. It is the chief trade-port of France. The chief industry is the making of soap, vegetable-oils and oil-cake. Soda, sugar, macaroni, iron, lead, zinc, ties and leather are also manufactured. There are large flour-mills and wine-vaults, and much fishing is done. The city is mainly built on the slopes overlooking the harbor. Its chief buildings are the cathedral, two interesting early churches, the health-office of the port, the museum, the Longchamp palace and the public library. There also are a botanical and zoological garden, an observatory and many special schools. Marseilles was the birthplace of Thiers. It is one of the oldest towns of France, and was founded by Phoceans (Greek colonists) from Asia Minor about 600 B. C. For 900 years it was a center of Greek civilization. It sided with the Romans against Carthage, its rival, and with Pompey against Cæsar, who stormed it in 49 B. C. It was held in turn by the Saracens, Charles of Anjou and Alphonso V of Aragon, and came into the hands of Henry III of France in 1575. Its trade has grown rapidly since the French conquest of Algiers and the opening of Suez Canal. Population, 550,619.

Marsh, George Perkins, an American philologist and diplomat, was born at Woodstock, Vermont, March 15, 1801, and died at Vallombrosa, Italy, July, 24, 1882.

Marshall, Thomas Riley, elected Vice President with Mr. Wilson on the Democratic ticket in 1912, was born at North Manchester, Indiana, March 14, 1854. He graduated at Wabash College in 1873 and was admitted to the bar in 1874. He took an active part in politics and was elected governor of Indiana in 1908. He belongs to the progressive element of his party, but pointed out in an interesting contribution to the *Atlantic Monthly*, on "The Automatic Citizen," the danger of attempting reform by too much legislation. He is a grand-nephew of John Marshall, Chief Justice of the United States, and a descendant of Charles Carroll, one of the signers of the Declaration of Independence. He died in 1925.

Mar'shall, John, chief-justice of the United States, was born in Fauquier County, Va., Sept. 24, 1755. His law-studies were interrupted by the Revolution, and he served in the army under his father from 1775 to 1779. In 1781 he began to practice law, and soon rose to the head of the Virginian bar. He was a member of the Virginian house of burgesses, the state legislature and the state convention that adopted the constitution. He was sent to France with Pinckney and Gerry as envoys in 1797, and with Pinckney was ordered to leave the country when they had declined Tallyrand's request for a loan. In 1799 he was elected to Congress, and in 1800 became secretary of state. He was made chief-justice of the United States in 1801, holding his position till his death on July 6, 1835. His decisions are considered authoritative on all matters of constitutional law. He wrote a *Life of Washington.* See *Life* by Magruder in the American Statesmen Series.



JOHN MARSHALL

Mar'shalltown, the county-seat of Marshall County, Ia., near Iowa River, 50 miles northeast of Des Moines, with a large trade in grain. It also has foundries, machine-shops and manufactories of soap, flour, oil and wire-fencing, furnaces, engines, scales, brick and tile. Besides, it has a pork-packery. Population 18,000.

Marsh'mallow, a class of plants with showy flowers, natives of Europe and Asia. The common marshmallow grows in salt marshes on our eastern coast. The whole plant is wholesome, abounding in fiber, mucilage, starch and sugary matter, though the mucilage is chiefly in the roots. The famous confection, marshmallow paste, is made from the roots. The plant is a close relative of the hollyhock, bushy and leafy, and grows to a height of from two to four feet. The downy leaves are broad, alternate, ovate or heart-shaped. The flowers grow in clusters and are of a pale rose-color, blooming in August and September.

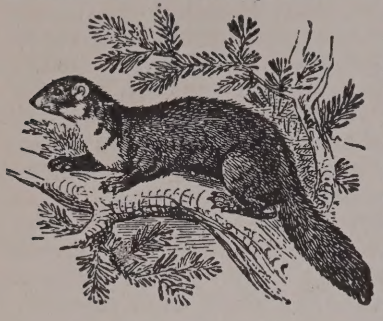
Mar'ston Moor, an historic plain, seven miles west of York, England, was the scene of a great victory of the parliamentary forces on July 2, 1644 over the royalist army of Charles I in the Civil War. Twenty-two thousand royalists were led by Prince Rupert. The parliamentary troops were under the Earl of Manchester, Cromwell and Crawford, in all 15,000 foot and 9,000 horse. The royalists fled, leaving 4,000 men dead on the field. This victory gave the whole north to the parliament, and first brought Cromwell into notice. See S. R. Gardiner's *History of the Civil War.*

Mar'ston, Philip Bourke, one of the best-known of the younger late-day English poets, was born at London in 1850. Philip was a pretty child, and it was to him that his godmother, the author of *John Halifax,* addressed her well-known poem beginning·

> Look at me with thy large brown eyes,
> Philip, my king.

Yet those handsome eyes went out into utter darkness, the result of a blow on one of them, got in a baby romp when Philip was but three. The blind boy began to write when he had hardly left off his bibs. At his father's house he met and well knew Browning, Swinburne, Dickens, Miss Muloch, Rossetti and many others. When of age his first book was published, *Song Tide,* sung in praise of his sweetheart. Three years later appeared his second book, *All in All,* telling of his great grief for the death of this same betrothed. His last volume, *Wind Voices,* is considered his best. Marston's poetry has pleased readers and critics alike, and much of it will live and be remembered. Marston died on Feb. 13, 1887.

Marsupials (*mär-sū'pĭ-als*), an order of the class *Mammalia,* embracing animals with a pouch or marsupium for containing the young. The pouch is a fold of skin on the ventral surface of the body. The young are born in a very rudimentary condition, and are attached to the nipples of the breasts shielded by the pouch. They are of limited geographical range, but formerly, as shown by fossils, occurred in nearly all parts of the globe. All except the opossum belong to the Australian region. The opossum lives in South America and the southern part of the United States. Besides opossums the principal kinds of marsupials are kangaroos, wombats, native bears, bandicoots, Tasmanian devils and pouched dogs.



PINE-MARTEN

Mar'ten (*mär'tĕn*), the common name for a number of closely related animals widely known on account of their fur. All belong to the genus *Mustela*. Besides fur bearing the name of marten, all sables come from these animals. They are abundant in the northern portion of the Old and New Worlds. They have long, slender bodies and short legs, and live mostly on trees. They run about upon the trees, leaping from one to another, much like squirrels. Their outer fur is long and glossy, and they have abundant, soft, under-fur. The Asiatic sable furnishes the celebrated sable, one of the best furs. "A single skin of a Russian crown sable with its natural, dark, bloomy black will fetch $200. Of such, a muff and boa would be worth $2,000, but sets of inferior quality may be bought for $250." The best skins come from Yakutsk, Kamchatka and Russian Lapland. The skins are in their best condition from November to January. In North America there are two species of marten, with a variety of local names. The pine-marten or American sable, similar to the pine-marten of Europe, is about the size of the large house-cat, with soft, deep fur of rich brown, lighter-colored below, a tawny spot on the throat. It is fond of forests far from the habitation of man, and shows special liking for pine-trees. Its range is the northern woods, but even there it now is rare. It feeds upon birds and animals. It multiplies rapidly, there being six kittens to a litter. For a nest it often makes use of one deserted by woodpeckers or squirrels; snuggling in the soft lining with only its head emerging, it looks out with alert inquisitiveness upon what is going on. The black marten, black fox, fisher or pekan, as it is variously called, is the largest of the group, being from two to three feet long with a tail one foot. It has no immediate relatives in the Old World. In color it is grayish-brown with dark markings, has a bushy tail tipped with black. It is bold, strong and aggressive, a skilful hunter; it kills bear-cubs and the Canadian porcupine. It is successful in stealing bait from traps, and is a nuisance to trappers. Its fare includes dead fish, rabbits, squirrels, chipmunks, ground birds, snakes, frogs and toads, and it relishes beechnuts and catnip. This largest of our martens, too, belongs to the northern woods, occurs southward in the Alleghanies, and shows preference for regions of hemlock and spruce. The stone-marten is another variety, with hair inclined to grayish and pure white on the breast.

Mar'tha. Opera in three acts, music by Friedrich Freiherr von Flotow (1812–1883). Remodelled from a ballet and first produced in Vienna, Nov. 25, 1847, whence its fame spread all over the world. A prominent feature of the opera is the introduction of the air, *The Last Rose of Summer.* Von Flotow's greatest success was achieved in *Martha* and *Siradella*, its predecessor. His work is light and melodious, enlivened by flashes of comedy and lively rhythms, more akin to the French than the German school, but devoid of qualities that insure permanence. The scene is laid at Richmond, England, in the time of Queen Anne, though the Italian version places it in the fifteenth century and the French in the nineteenth.

Mar'tha's Vine'yard, an island off the southeastern coast of Massachusetts, is 21 miles long and six wide, and forms Dukes County, Mass. It was discovered by Gosnold in 1602, and named by him; settled in 1642 by an English merchant; and from 1664 to 1692 belonged to New York. It has a lighthouse on Gayhead, and is popular as a summer resort. The chief towns are Edgartown, Cottage City, Vineyard Haven and Tisbury. The island is separated from Nantucket by Muskeget Channel.

Mar'tial Law is an arbitrary rule which may supersede municipal or state law by the sanction of the executive instead of the legislative power. A state of martial law may be declared in America by the president in time of danger; and it is generally held that the president is the sole judge whether the danger is sufficiently great to justify the proclamation of martial law. The hostile occupation of a territory necessarily involves a state of martial law, until the commander-in-chief removes this state by proclamation. Martial law is not exactly military law, which has a sanction and limits under the constitution; it is a temporary suspension of constitutional law. The American constitution provides that the principle of *habeas corpus* shall not be suspended unless the general welfare, as in cases of rebellion or invasion, may demand it. This is an indirect admission that martial law may be necessary in certain cases. Martial law may be more or less stringent according to necessity. It is usually administered by military courts; but the proclamation is sometimes made that civil and criminal cases shall be tried according to the customary principles of administration. In the United States the principal test of martial law occurred in connection with the war and reconstruction in the south (See RECONSTRUCTION IN THE SOUTH).

Mar'tial, Marcus Valerius Martialis, one of the finest among the few Latin poets who did not borrow from the Greeks and the greatest of all epigrammatists in verse, was born at Bilbilis, Spain, March 1, 38 or 41 A. D. After studying at home he went to Rome, where Piso, Seneca and other leading men became his patrons. After 34 years in Rome the younger Pliny lent him money enough to go back to Spain, for which he was homesick. Here, at Bilbilis, a new patron gave him an estate on which, with its grove, fountain, vineyard, garden, fishpond and dovecote, he spent the remainder of his life comfortably. As an epigrammatist he remains without an equal. He lifts the veil from the Rome of the time of Domitian and shows it mainly on its seamy side, with a likeness to life not outdone by the engravings of Hogarth. Martial died in 104 A. D.

Mar'tin, the common name for certain large swallows found in Europe and America. The North American form is often called the purple martin on account of the color of its upper parts; glossy, iridescent black, reflections purple and blue. Like other swallows, it has long wings and a deeply-forked tail; unlike swallows generally, its note is soft and musical. The bird is distributed throughout North America, winters far down in South America, and migrates late in April and early in September. It nests near houses, and where boxes are placed for it will occupy the same shelter year after year. Once these boxes were the rule about every farmhouse, and familiar to almost every farmer-boy was the graceful circling of the invited bird above the kindly-prepared home; but the English sparrow, that robber and destroyer of peace, has taken possession of the martins' houses, and chased the desired bird away from neighboring with man. In the south the negroes hang gourds about their cabins for the martins, knowing that these plucky little birds will fight intruding hawk or crow, and thus will protect their chicken-yard. Martins' eggs are white. The number of injurious insects destroyed by these birds is enormous — in the height of their activity, probably several hundred every day for each bird. The European house-martin is similar in habits. See Blanchan's *Bird Neighbors.*

Martineau (*mär'tĭ-nō*), **Harriet,** was born at Norwich, England, June 12, 1802. Her father was a manufacturer and gave her a good education. Before she was 20 she began to write for the magazines, and in 1829 the failure of the firm in which she and her mother and sisters had placed their money obliged her to earn her own living. A series of stories, *Illustrations of Political Economy,* which she brought out in 1832, made her widely known. In 1834 she came to America for two years, and soon after published *Society in America.* Among her books are four volumes of children's tales; *Forest and Game-Law Tales; Laws of Man's Social Nature and Development; Deerbrook;* and *Biographical Sketches.* One of her most important works was the careful translation of Comte's *Positive Philosophy.* Miss Martineau was a vigorous thinker, seeing clearly and saying clearly what she had to say. She died in Westmoreland on June 27, 1876. See her *Autobiography*

Martineau, James, an Englishman, a Unitarian minister and an author of note, was born at Norwich on April 21, 1825. He was a brother of Harriet Martineau. He was educated at private schools and was ordained by the synod of Munster, Ireland, in 1828. Dr. Martineau gradually moved farther and farther from the standards of the synod, but claimed to the last to be a Presbyterian minister. He was appointed professor of philosophy in Manchester New College and, later, principal, serving in this institution from 1840 to 1886. He followed the college when it moved to London in 1857. He was a voluminous writer, chiefly upon philosophical and religious themes, his best-known works being *The Rationale of Religious Inquiry; Endeavors after the Christian Life; Types of Ethical Theory; A Study of Religion;* and *The Relations Between Ethics and Religion.* He died at London, Jan. 11, 1900.

Martinique (*mär'tĭ-nēk'*), a colony of France in one of the Lesser Antilles in the West Indies. It is 43 miles long, from 12 to 20 broad, and covers 380 square miles. The island was discovered by the Spaniards in 1493, settled by the French in 1635, and, except for three short intervals when held by the British, has since 1635 been a French colony. A high, thickly-wooded ridge runs from north to south. The coast is high and indented, except on the west, where are the main trading town, St. Pierre (population 24,000), and the capital, Fort-de-France (population 27,069), which was nearly ruined by fire in 1890. Half the land tilled is given to sugarcane; the other chief crops are manioc, sweet potatoes and bananas. The principal exports are sugar, molasses, cocoa, coffee and rum. In 1905 the exports amounted to 18,069,422 francs. There is a force of French troops consisting of 781 European officers and men. There are 17 sugar-works and 118 rum-distilleries. Besides a law-school at Fort-de-France, with 166 students, there are three secondary schools (836 pupils), a normal school and 109 primary schools with 11,589 pupils. Population 182,024; but only 12,000 are whites.

Marvel, Ik. See MITCHELL, DONALD GRANT.

Marx, Karl, German socialist, was born at Trèves, Prussia, May 5, 1818. It was at first intended that he should be a lawyer, but at the Universities of Bonn and Berlin he gave most of his time to history and philosophy. In 1842 he became editor of a democratic newspaper, the *Rhenish Gazette*. In 1843 he went to Paris, then the headquarters of socialism. He soon began the writing and labor for the advancement of socialism which made the work of his life. Driven from France in 1845, he settled in Brussels, where he wrote his attack on Proudhon's philosophy. His chief work at Brussels was the reorganization of the communistic league, for which he wrote the famous *Manifesto*. Marx took an active part in the Revolution of 1848, and after its failure settled in London. In 1859 he published his *Criticism of Political Economy*, which showed a remarkable knowledge of the economic growth of modern Europe. He was foremost in founding the International Society. His greatest book, *Capital*, came out in 1867. This book, as also his other works, shows him to have been a man of wonderful knowledge handled with masterly skill. Marx, much more than any other man, influenced the labor movement throughout the world. He died at London, March 14, 1883. See Labor and Socialism.

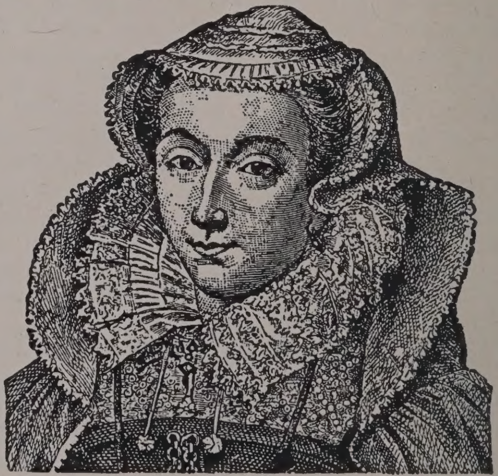
Mary the Virgin, the mother of Jesus, is held in high honor by all Christians. Of her life but little is known. It is implied in *Matthew* that she was of the same family as her husband and a descendant of David. She is mentioned but a few times in the New Testament, and almost always with reference to her relations to Christ. The last notice of her is of her "persevering in prayer" with the disciples and the holy women at Jerusalem after Christ's ascension. A letter speaks of her as having lived with John at Ephesus, where she died and was buried. Another letter asserts that she died and was buried at the foot of the Mount of Olives. The story is also told of the apostles coming to her tomb on the third day after her burial, and finding the tomb empty but breathing out an "exceeding sweet fragrance." In art she is usually indicated by the term The Madonna; in ecclesiastical phrase as Mary the Virgin. The date of her death is commonly fixed at 48 or 63 A. D.

Mary I of England, daughter of Henry VIII and Catherine of Aragon, was born at Greenwich Palace on Feb. 18, 1516. She is usually known as Mary Tudor. When a girl she was a great favorite with her father, and was devoted to her mother and church. When her mother was divorced, Henry treated her harshly, and during her half-brother Edward's reign she lived in retirement. But no threats could make her conform to the English church. On the death of Edward, July 6, 1553, Mary became entitled to the crown. Though Lady Jane was declared queen, the whole country favored Mary, who was able without bloodshed to enter London in triumph on Aug. 3. The queen showed remarkable leniency toward her enemies. She sought gradually and carefully to bring back the Roman religion A few leading reformers were imprisoned, but there persecution stopped. Queen Mary's reign was ruined by her marriage to Philip II of Spain. The proposal caused Wyatt's rebellion. This rising was put down and Jane Grey was, with her husband and father, beheaded. Cardinal Pole entered England as the pope's legate, and the country became once more Roman Catholic. Then began the persecution which earned the queen the name of Bloody Mary, when some three hundred victims were burnt at the stake. During this time Mary was almost helpless with ill-health. Calais, the last English foothold on French ground, was lost, and Mary died on Nov. 17, 1558. See the histories of Froude and Lingard and *England under Edward VI and Mary* by Tytler.

Mary II of England. See William III.

Mary Mag'dalene, probably so named from Magdala, a town of Galilee, a woman mentioned as "Mary Magdalene, out of whom went seven devils," was among those that accompanied Jesus. She is held to be the same as the woman "which was a sinner" who washed the feet of Jesus with her tears and wiped them with her hair and anointed them. She is thought by some to be Mary, the sister of Martha and Lazarus, for which there is little ground. The story that she passed her last days in the desert in penitence for her sinful life has been made the subject of paintings by Guido, Correggio, Canova and other great masters.

Mary Queen of Scots (Mary Stuart) was the daughter of James V of Scotland and Mary of Lorraine, daughter of the French Duke of Guise. She was born at Linlithgow on Dec. 8, 1542. Her misfortunes began with her birth. Mary, on the death of her father, became a queen before she was a week old. But, hating an English match, the young queen was offered (1548) to the



MARY QUEEN OF SCOTS

oldest son of Henry II of France. Her next ten years were passed at the French court, where she was taught with the king's children. At sixteen she was married to the dauphin Francis. In 1559 Francis came to the throne, and for a year and a half Mary was queen of France. When Francis died, Mary cared little to stay at a court now ruled by the queen-mother, Catherine de Medici, whom she had taunted with being a "merchant's daughter." Her presence was needed, too, in Scotland, for her mother had just died and the country was without a government and torn by the Reformation. Mary landed in 1561, after escaping the English ships which Elizabeth had sent to capture her. The Reformation claimed to have been sanctioned by the Scottish parliament, and the queen was content to leave affairs as she found them, only claiming the liberty to use her own religion. In 1565, Mary suddenly married her cousin, James Stuart, Lord Darnley. Darnley was weak and vicious. This marriage caused the earl of Moray, the queen's natural brother and her chief minister, to head a Protestant rising; but the revolt was quelled.

Mary soon became disgusted at Darnley's worthlessness and alarmed at his ambition. He had been given the title of king, and now claimed that the crown should be secured to him for life and to his heirs, if the queen died childless; and what Mary refused as a favor he prepared to take by force. Mary's chief minister since Moray's rebellion had been Rizzio, a common-looking Italian, of brains and accomplishments, but generally hated as a low-born foreigner and a court favorite. So a conspiracy was formed by the king and Moray and other Protestant leaders, they binding themselves to secure the crown to him and his heirs, and he agreeing to have them pardoned. The result was the murder of Rizzio on March 9, 1566, Darnley leading the way into the queen's cabinet and holding her in his grasp while the murderers slew the Italian. When Darnley dismissed the parliament about to bring Moray and the other defeated rebels to trial, Mary realized the purpose of the conspirators and set to work to defeat them. She succeeded in detaching Darnley from the others, and persuaded him to deny all connection with their designs. This ended the conspiracy and the king was hated by both sides, as he had betrayed both. In February, 1567, the house in which the king slept was blown up, and his lifeless body found in the neighboring garden. The chief murderer was the earl of Bothwell, who had enjoyed a large share of the queen's favor since Moray's revolt, but the queen herself was suspected, for within three months Bothwell was acquitted at a mock trial, divorced from his wife and made duke of Orkney. Then he married the queen.

This fatal step at once arrayed the nobles against Mary. Her army melted away without striking a blow, and she was forced to give up the throne to her son, James VI. The next year, escaping from prison, she found herself in a few days at the head of 6,000 men, only to be defeated. Four days later on May, 17, 1568, Mary crossed the Scottish borders and threw herself on the protection of Queen Elizabeth, only to find herself a prisoner for life. Mary, as the great-granddaughter of Henry VII, claimed the right of succession to the English throne. A good part of England was still Roman Catholic and looked to Mary to restore the old faith. Of the many plots formed for her deliverance, the most famous was the one of Anthony Babington, which included the assassination of Elizabeth. It was discovered, letters of Mary, approving the death of the English queen, came into the hands of the ministers; and Mary was brought to trial in September, 1586. She was sentenced to death in October, but Elizabeth could not find courage to sign the death-warrant until February, 1587. On the eighth, at Fotheringay Castle, Northamptonshire, Mary laid her head on the block with the dignity of a queen and the courage of a martyr.

Mary's beauty and accomplishments are famous the world over. She was admitted by everyone to be the most charming princess of her time. She was queenly in appearance, on the throne, in the dance or on horseback at the head of her army. The charm of her soft, sweet voice is said to have been irresistible; and she sang well, accompanying herself on the harp or lute. Her manner was sprightly, affable, kindly and frank. Her rather large features were lighted by a winning vivacity and a high, joyous spirit. The starlike brightness of her eyes—whether hazel or dark gray we know not—her fresh, clear complexion and hair of ruddy yellow changing with her years to auburn, then to dark brown, turning gray long before its time, added their share to the beauty that bewitched French, English and Scotch alike. Two women only, Cleopatra and Helen of Troy, share with Mary Queen of Scots the power wielded over the imaginations of men of all times and countries.

Maryland (*mĕr'ĭ-lănd*), a south Atlantic State and a border State between the north and south, is one of the thirteen original states of the American Union. It is bounded on the north by Pennsylvania; on the east by Delaware and the Atlantic Ocean; and on the south and west by Virginia and West Virginia. The famous Mason and Dixon's line follows the northern and eastern boundary of the State, giving it the popular name of "The Old Line State." The outline of the State is extremely irregular; Maryland covers a total area of 12,327 square miles, 2,386 square miles of which are water.

Surface. The surface of Maryland is greatly diversified. It is irregularly shaped, and broken by the long arm of the Chesapeake Bay which stretches up northward from the Atlantic almost to Pennsylvania, from which the Susquehanna River flows down to meet it. The State drains from either side and from the north into this Bay. All along the southwestern boundary flows the Potomac River. The River and Bay are extremely important to commerce. A few insignificant rivers empty into the Atlantic Ocean, and one into the Ohio River, but the others, navigable and larger flow into Chesapeake Bay. From the east into the Bay flow the Pocomoke, Wigomico, Nanticoke, Choptank and Chester; and from the west the Gunpowder, Patapoco and Patuxent. Near the ocean the land is low and flat. The portion of the State east of Chesapeake Bay is called the Eastern Shore; that immediately west of the Bay, the Western Shore. Both portions are in what is known as the Coastal Plain region, which includes three-fifths of the State. Taken together, the Eastern Shore and the Western Shore are commonly known as Tidewater Maryland. The Eastern Shore is the lowest part of the State. The Western Shore is more undulating and elevated. A "fall line" extends from Washington, D. C., northeast through Baltimore to cross the Susquehanna River, and marks the southern edge of the Piedmont Plateau. Along this "fall line" a descent of about 100 feet is frequently made within a few miles, and is naturally marked by many waterfalls, rapids, and cascades. About 2,500 square miles of the Piedmont Plateau is included within Maryland, extending west of the "fall line" to the base of the Catoctin Mountains. In the far western corner of the State are high ranges of the Alleghenies, merging into the Appalachian Plateau. Great Backbone Mountain in this section rises to a height of 3,400 feet, the highest altitude in the State. There is varied and beautiful scenery, with plains, valleys, rivers, falls, bays and mountains. The State is famed as a pleasure resort, and a delight to duck hunters.

Climate. The climate of Maryland is generally warm and healthful. It is varied, due to the influence of the ocean, the bay and the mountains. The mean annual temperature for the entire State is between fifty-three and fifty-four degrees. In the eastern and southern sections mild winters and hot summers prevail, while in the western and hilly sections the winters are cold and the summers cool. The annual precipitation averages about forty-three inches.

Production and Industry. The production and occupation of the various parts of the State are largely determined by its physical features. In the west, coal and lumber are the chief products; in the central section, corn and wheat; and in the east, fish, fruit and vegetables. There is a great variety of soils. The sandy loams of the Eastern Shore favor farm crops, vegetables and fruits. Bordering the Piedmont Plateau are plastic clays and coarse sands. The northern sections are better drained clays and loams, excellent for cereals, grasses, fruits and vegetables. The Piedmont soils range from soft loams to heavy clays, especially good for grasses, wheat, corn and tomatoes. The river valleys have narrow alluvial strips of loam. The most common soil is gneiss with a clayish subsoil. In the eastern mountainous section is a clayish soil mixed with Cambrian sandstone, well adapted to peach culture. The Allegheny ridges have only a thin and stony soil.

The most valuable mineral in the State is coal. Almost all of the high-grade coal for blacksmithing comes from Maryland, where the deposits are part of the great Appalachian coal field. In 1932, there were produced 1,370,000 net tons of coal, and 367,614 gross tons of pig iron. There is an abundance of good building stone, chiefly granites, limestones, slate, marble and sandstones. Brick, potter's clay, tile clays and fire clay are all very important mineral products. The Piedmont region contains excellent porcelain materials. Mineral paint is produced from the counties lying between Washington, D. C., and the Chesapeake.

Agriculture is an important industry. In 1930, there were 42,203 farms containing 4,374,398 acres. The chief crops in 1932 with their production were wheat, 4,940,000 bushels; maize, 16,440,000 bushels; potatoes, 2,945,000 bushels, and tobacco, 22,750,000 pounds. Hay, vegetables for the northern market, and fruit, are also heavy crops. The fisheries of Maryland are important. For years there was no regulation over the oyster beds, which were stripped year after year unscientifically, until Maryland began to lose rank in the field of oyster production. In 1916, however, regulations began to be made for the taking of oysters, which have since resulted in Maryland regaining her standing until at present the State ranks second in the Union in oyster fisheries, and also takes large catches of other shellfish, and shad, bass and perch.

In 1929, the census reported 3,229 industrial establishments employing 131,399 workers, who earned $149,051,281 and produced goods valued at $1,120,409,508. The leading industry is the manufacture of men's and women's clothing, men's shirts and straw hats. Men's furnishings, meat packing and tinware are also important manufactures.

Transportation. The State maintained in 1932 steam railways extending over 1,432 miles and electric railways 731 miles long. There are 3,412 miles of State-maintained, surfaced highway. Baltimore is an important seaport, used by fifty-one steamship lines. It is the nearest ocean port to the steel centers of Pittsburgh, Youngstown, Cleveland, Gary and Chicago, and also handles a large part of the grain and other exports. In 1932 the value of the exports from Baltimore was $24,489,000, and of imports $46,141,000. Water transportation is highly developed especially on the Chesapeake and the Potomac. There is excellent air transportation, Washington, D. C., and Baltimore being connected by air with all the chief cities of the United States.

Population. The population of Maryland in 1860, was 687,049. In 1930, it numbered 1,631,526, an increase of 12.5 per cent since 1920.

Of this total, 5.8 per cent were foreign born whites; 77.2 per cent native born whites; 16.9 per cent Negro, and 59.8 per cent urban. In 1930, Baltimore, the largest city of the State and chief manufacturing and commercial center, had a population of 804,874, which was forty-nine per cent of the total population of Maryland. Other important cities, with their populations in 1930, are: Cumberland, 37,747; Hagerstown, 30,861; Frederick, 14,434; Salisbury, 10,997, and Annapolis, the capital, 12,531.

Education. Education in Maryland is compulsory for children from seven to fourteen years of age; and from fourteen to sixteen unless they are legally employed. Illiteracy in 1930 was 3.8 per cent as compared with 5.6 per cent in 1920, and 7.2 per cent in 1910. Negro illiteracy was 11.4 per cent. In 1932 the State had 1,658 elementary and junior high schools, 1,121 of which were for whites and 537 for Negroes. These schools had a total enrollment of 244,690 pupils (49,682 Negroes), and a total teaching force of 6,956. There were 179 public senior high schools with an enrollment of 42,803 and a faculty of 1,710. There are four State normal schools in Maryland, and one city normal school. The total expenditure on education in 1931-32 was $27,592,906.

The chief institution of higher learning is the world-famed Johns Hopkins University, organized in 1876. This non-sectarian university enrolled 6,214 students in 1932, with a faculty of 681. Its medical department is particularly celebrated, and the hospitals there attract patients from all over the world. Among other important institutions are Goucher College for Women, founded in 1888; St. John's College, and the University of Maryland. The United States Naval Academy at Annapolis is famous the world over. Among the many artistic institutions are the Peabody Institution for the Education of Music, the Maryland Institute School of Art and Design, and Walter's Art Gallery.

Government. Maryland was one of the thirteen original States, and is divided into twenty-three counties, and Baltimore City. The District of Columbia, including Washington, D. C., has an independent government. Voters are United States citizens who have lived one year in the State and six months in the Legislative District. The General Assembly is composed of a Senate of twenty-nine members and a House of Delegates of 118 members, both elected for four years. Maryland is represented in the National Congress at Washington by two Senators and six Representatives.

History. Maryland was first seen by Captain John Smith, who sailed up the Chesapeake in 1608. In 1632 a charter for the land was given Cecilius Calvert, the second Lord Baltimore, by Charles I. This grant included parts of Delaware and Pennsylvania. Lord Baltimore named his new territory Maryland, in honor of Henrietta Maria, Queen of England. His brother Leonard brought the first settlers to St. Clement's Island near St. Mary's in 1634. This group comprised English gentlemen, and their households and servants. On March 27 they settled definitely at St. Mary's.

Maryland played an important rôle in the making of early American history. In 1649 the famous Act of Toleration was passed. Although Calvert was a Catholic he tolerated all religions within the borders of Maryland. In 1655, during the Civil War in England, sympathizers of the two English parties fought at Providence, Maryland, with fifty casualties resulting. This was the first land-battle between English-speaking men in America. In 1652 the country had been siezed by commissioners of Parliament. It was restored to Lord Baltimore in 1657, and again siezed in 1689 by an association of Protestants under John Coode, who captured St. Mary's and claimed Maryland for William and Mary of England. In 1694 the capital was moved from St. Mary's to Annapolis. Not until 1715 was the province restored to the fifth Lord Baltimore. Maryland was one of the first colonies to engage actively in the Revolutionary War. In November, 1776, a bill of rights and a constitution were drawn up, and on February 5, 1777, the first legislature convened at Annapolis. A Federal Constitution was drawn up in convention on April 28, 1788. During the Civil War, Maryland did not secede, although it was a slave-holding State which undoubtedly saved the capital from the Confederates. The presence of Washington, D. C., on its boundaries has focused national attention on the State. In Baltimore, founded in 1730, is Tudor Hall, the home of John Wilkes Booth, who killed Abraham Lincoln. The Civil War battle lines have left numerous historic landmarks throughout the State of Maryland.

Maryland, my Maryland, an American national song. Words by James Ryder Randall, adapted to the German folk-song, *O Tannenbaum.*

Masaccio (*mä-zät'chō*), whose real name was TOMMASO GUIDI, and nicknamed by his artist acquaintances Masaccio because of his careless dress, was born at Maso di San Giovanni, near Florence, on St. Thomas' Day, 1401. This date is disputed by some writers who place his birth in 1417. Masaccio was the son of Giovanni di Simone Giudi, a notary, and at a very early age began to show signs of unusual ability in drawing and color. He went to Florence and entered the circle of artists, most of whom are famous now for solving such problems as perspective and anatomy. These men were assisting Ghiberti the sculptor. Here Masaccio learned the principles of design and soon showed a superiority over his fellow-students and workers. It is claimed by some that Masoline was his instructor, but this is uncertain on account of the confusion of the dates. In 1417 he went to Rome and decorated the chapel in the church of San Clemente. Here he painted a crucifixion and scenes from the life of St. Catherine. He also painted portraits of Pope Martin V and Emperor Sigismund. In 1421 he returned to Florence and entered the guild of *Speziali* and in 1424 that of painters. It was through the influence of Giovanni di Bicci de Medici, who had regained his power in Florence in 1420, that he received his commission to decorate the chapel of Brancacci in the church of Carmine. Some writers assert that Masaccio was called to finish this work which was started by Masoline, so that not all the paintings here can be attributed to him. At this he worked from 1423 until his death, which occurred very suddenly at Rome in 1428. It has been hinted that he died of poisoning at the hands of his contemporaries, but this story of his death is very uncertain. Besides the works already mentioned, he painted frescoes in Santa Maria Novella and a group of St. Ann, the Virgin and the infant Savior, which originally was for the church of St. Ambrogio but now is in the *Academia delle Belle Arti* in Florence. A number of paintings by Masaccio, not in existence now, are mentioned by Vasari. Masaccio has been called the founder of modern painting, because he broke the ties that bound art to the traditions of the church and the time. He solved the problem of so foreshortening the feet that the figures did not seem to be standing on tiptoe. He was the first to paint landscape backgrounds with any degree of success, and in his painting of the figure he caught the very essence of the inner life. His decorations in the Brancacci have been studied and loved by some of the world's greatest painters, among them Michael Angelo, Leonardo da Vinci, and Raphael.

Masaniello (*mä-zä-nyĕl'lō*), whose real name was TOMMASO ANIELLO, was a fisherman of Amalfi, Italy, who was born about 1622. He became a Neapolitan insurrectionist and the leader of the revolt which took place in Naples in July, 1647, against the Spanish viceroy, the duke of Arcos. A government was set up by the citizens, and Masaniello was made captain-general of the Neapolitan people. An attempt of some nobles to murder him cost their own lives. In addition, the viceroy was obliged to give back the privileges bestowed on the citizens by Charles V, and the people were allowed to keep their arms until this agreement should be ratified by the king of Spain. The rising brought to a successful end, the hero of the hour threw off his rich robes and declared himself a fisherman again. The people, however, would not let him resign. The next day he was a different man; either success or poison had turned his head, and the freedom he had fought for soon gave place to a reign of terror. The people withdrew their support and the viceroy's agents found no difficulty in assassinating him at Naples on July 16, 1647. His reign lasted just nine days. Auber's opera, *Masaniello,* is based on the story.

Mascart (*mȧs-kȧr'*), **Eleuthere Elie N.,** an eminent French physicist, born on February 20, 1837. He entered the normal school at Paris in 1858 and received his doctor's degree in 1864. In 1872 he was appointed professor of physics in the College of France. Six years later he was placed in charge of the meteorological bureau of France. He was elected to the Academy of Sciences in 1884. His principal work is in the fields of atmospheric electricity, optics and terrestrial magnetism. As a writer of treatises on these subjects he rendered important service.

Mashonaland (*mȧ-shō'nȧ-lănd*), a province of Southern Rhodesia, in British South Africa, is situated northeast of Matabeleland. It includes the plain—4,000 to 4,600 feet high—whose backbone is formed by Umvukwe Mountains. It is said to be the healthiest part of South Africa, with rich soil, grass all the year round and many running streams. The Matabele drove the Mashona to the mountains, where they built their villages on almost inaccessible crags. A peaceful and industrious people, of the Bantu race, they lived in the greatest fear of their fierce neighbors. They cultivate rice, Kafir corn, Indian corn, groundnuts, sweet potatoes, tobacco and cotton, which they weave into blankets. Iron, copper and gold are found in large quantities. Mauch, a German traveller, discovered many old mines which at one time had been skilfully worked, especially at a place called Zimbabwe, which he thought was the Ophir of the Bible. Mashonaland became a British protectorate in 1888. With Matabeleland, Mashonaland has since been organized by the British South African Company, under Cecil Rhodes, and is now named Southern Rhodesia. Mashonaland and Matabeleland, or Southern Rhodesia, have a population of 1,109,012, according to the census of 1931. The capital is Salisbury which is now reached by a railway line from Bulawayo, thence south to the Cape. It has a population of approximately 28,800, including the suburbs.

See RHODESIA.

Mason, George, an American statesman, was born at Doeg's Neck, Virginia, in 1725. In 1775 he was made a member of the committee of safety, of the Virginia Convention, which was charged with the government of the colony. The next year he drew up a declaration of rights and a constitution for the new state, which were adopted without an opposing vote. With the help of Jefferson, Mason succeeded in having a bill passed making all kinds of worship lawful in Virginia. In 1777 he became a member of the Continental Congress. In 1787 he was one of the foremost men in the convention which drew up the Constitution of the United States, where he took firm ground against making slavery a permanent institution. He feared that the constitution, as at last agreed upon by the convention, would bring about a monarchy or a tyranny of aristocrats, and stood shoulder to shoulder with Patrick Henry in fighting ratification by Virginia. He sought to have about twenty changes made, some of which were later adopted by

Congress. He was chosen as Virginia's first United States senator, but refused to serve in that capacity. His statue stands with Jefferson's, Henry's and those of other leading Virginians at the base of Crawford's statue of Washington in front of the capital at Richmond. Mason died in Fairfax County, Virginia, in 1792.

Mason James Murray, an American jurist and statesman and a Confederate commissioner to England in 1861, was born in Fairfax County, Virginia, on November 3, 1798, a grandson of George Mason. He was graduated from William and Mary College, and was admitted to the Virginia bar when twenty-two years of age. He served many years in the Virginia house of delegates and in the federal Congress from 1837 to 1839. He was elected to the National Congress as Senator from Virginia in 1847, and retained that place until the opening of the Civil War, when he cast in his lot with the seceding states. He was captured on November 6, 1861, when on his way to Europe to represent the Confederacy abroad. He was held a prisoner by the federal authorities until January 1, 1862. At that time, upon the demand of the English government, he was released. His mission to England, after all, proved ineffective, although it nearly embroiled the two nations in war. Mason died near Alexandria, Virginia, on April 28, 1871.

Mason, Lowell, an American composer, was born at Medfield, Massachusetts, on January 8, 1792. As a boy he was very fond of music and began to teach it when quite young. In 1821 his *Boston Handel and Haydn Collection of Church Music* was published. He immediately became famous and he was enabled to leave Savannah, where he had taught for fifteen years, and make Boston his headquarters. Here he taught children's classes without charge, and published a number of music-books for children, as well as glee-books, and more than twenty books of sacred and church music. A large part of the best American sacred music is the work of Mason's. He died at Orange, New Jersey, in 1872.

Mason and Dixon's Line, often thought to be a line in the United States dividing the slave-holding states from the free states. In fact, it ran for over a third of its length between two slave states, Maryland and Delaware. It was run by two English surveyors, Charles Mason and Jeremiah Dixon, during 1764-67, and determined the boundary between Maryland and Pennsylvania and between Maryland and Delaware. Milestones were set up and each five miles marked by a larger stone, on which were cut the coat of arms of William Penn and Lord Baltimore. The work was so well done that when, in 1849 it was re-surveyed, no mistake of any importance was found. The line does roughly divide the North from the South, however, and is popularly used to distinguish the two sections of the country.

Masons. See FREEMASONS.

Mass, the name which has been given to the amount of matter in a body. The mass of a body, the amount of matter in a body and the inertia of a body are strictly synonymous terms as used in modern physics. Matter and therefore mass have not been defined in terms of anything simpler; but mass can be measured in terms of many other quantities. Thus mass is equal to the product of volume by density. In like manner the mass of a body is equal to the quotient of its weight divided by the acceleration of gravity. A sharp distinction between *mass* and *weight* is essential to all clear thinking on this subject. The standard of mass used in ordinary commerce is the mass of a piece of metal kept in the Standard's Office, London, and known as the avoirdupois pound. The standard of mass employed in science is a piece of metal kept at the International Bureau of Weights and Measures at Sèvres, and known as the kilogram.

See INERTIA.

Massachusetts (*măs-ȧ-chōō'sĕts*), one of the group of States, well known as New England and also the leading member of this group in the colonies which formed the original thirteen states into the United States of America. The State is small having only 8,266 square miles in its area. It is forty-seven and one-half miles wide and 182 miles long, being but one-sixth as large as the State of New York, and the forty-fourth State in the Union as to size. It is bounded on the north by Vermont and New Hampshire; on the east by the Atlantic Ocean; on the south by Connecticut, Rhode Island and the ocean; and on the west by New York. Cape Cod is a sandy point reaching into the ocean in the shape of a bent arm and forming Massachusetts Bay. From this formation the State derives its nickname the "Bay State."

Surface. Geographically the State is divided into four quite distinct physical parts. The western highlands include the beautiful Berkshire Hills. The Green Mountains of Vermont extend into this section of the State in two ranges, with no very high peaks. Greylock, the highest peak of the Saddle Mountain is the highest elevation in the State. This section has grown to be a favorite spot for summer resorts and its scenic beauty is often compared to that found in Switzerland. The Connecticut Valley, including the river by the same name, and the Holyoke range of mountains consists of a wide flood plain sloping in a southeasterly direction. Mount Tom, another picturesque spot of the State is situated here, rising to a height of 1,214 feet, amid many smaller ridges and hills. To the east extends a wide plateau, gradually sloping toward the Atlantic Ocean which includes the eastern highlands. The low coastal plain is that portion of the State which gradually slopes to the ocean being flat or gently rolling. The Connecticut and Housatonic Rivers flow through the western half of the State while the Merrimac and Concord Rivers are the principal rivers in eastern Massachusetts.

Climate. Extreme temperatures exist during both the summer and winter seasons. The ocean tempers the coast so that both seasons are less severe in this region, while inland the temperatures recorded in the winter are often twenty degrees below and lower, while the summer temperatures have been recorded up to 100 degrees. Boston has a mean annual temperature of forty-eight degrees. The annual precipitation of the State averages about forty-five inches, and along the coast, fogs are very frequent. The mountainous regions of the State boast of an invigorating healthful climate which is delightfully cool during the summer.

Minerals. The principal mineral in the State is granite which was quarried as early as 1650 to be used for building stone. Clay pits and stone quarries are abundant, with a fine quality of marble and sandstone found in the State. Little mining is done although small quantities of iron and coal ore, also quartz, emery, gold and limestone are mined. The leading cities where granite is quarried are Quincy, Milford, Rockport, and Milton.

Production and Industry. Massachusetts has little fertile soil and that is found in the valleys of the Connecticut and Housatonic rivers. Agriculture, however, is carried on intensively here, and produces much of the marketed vegetables for the larger cities of the State. There were 25,598 farms in 1930 with an area of 2,005,461 acres and 564,000 acres devoted to crops. The farms and buildings were valued at $261,222,000 that year. The cranberry crop is most important and Massachusetts ranks first among the states in this commodity, producing 360,000 barrels in 1932. Hay, potatoes, corn, tobacco, apples and onions are other important crops.

The livestock industry is devoted almost entirely to the furtherance of dairy farming. There were 149,000 milch cows; 179,000 other cattle; 10,000 sheep, and 101,000 hogs in Massachusetts in 1932.

The leading industry in colonial days was fishing and Massachusetts still is the leading State in the Union in this respect. Gloucester and Boston are the chief cities where great catches are brought in of cod and mackerel, with lesser amounts of halibut, herring, hake, haddock, pollack, lobster and oysters. Whaling off Nantucket in the late seventeenth century played an important rôle of those times.

Massachusetts is predominantly a manufacturing State and derives great wealth from this source of industry. It is the greatest shoe and boot making State in the Union with large factories at Brockton, Lynn and Haverhill. In 1930 this industry was valued at $244,417,741. The oldest watch factory in the United States and the largest in the world is at Waltham. Woolens and worsted mills in Lawrence are the largest in the United States and the manufacturing of these goods were valued at $196,943,782 in 1930. The production of cotton goods is another principal industry of the State, the cotton spindles using 340,372 bales of cotton during 1930 and the industry valued at $151,804,379. The 9,586 establishments manufacturing various commodities in 1930 employed 481,449 wage earners, earning $573,838,044. Countless other articles are manufactured in the Bay State including cutlery, tools, rugs and carpets, silk, twine, felt goods, leather goods other than shoes, hosiery, hats, and caps, knit goods, bicycles and motorcycles, and electrical machinery. The leading manufacturing cities other than Boston and those named are Adams, Plymouth, Holyoke, North Adams, Webster, Springfield, Woburn and Peabody.

Water power from its rivers is being rapidly developed which furthers industrial growth and the wealth of the State.

Transportation. The State operates a network of steam and electric railways which connect all the industrial centers with other points in the United States. There are 2,014 miles of steam roads and 1,893 electric roads. The Quincy Railroad consisting of three miles was constructed in 1826-7, to carry granite from the quarries to Charlestown for the construction of Bunker Hill monument. This is the first railroad laid in the United States, and the first steam road was laid in 1835 connecting Boston and Lowell. Hoosac Tunnel, which was cut for five miles through Hoosac Mountain, was constructed at a cost of $16,000,000 by the State. Twenty years were required for its completion. The Cape Cod Canal, which is thirteen miles long, connects Boston with New York and was built to avoid the dangers of the water between these two great industrial centers. Several rivers have been made partially navigable, further facilitating rapid and cheap transportation along with the abundant coastwise shipping facilities.

Population. Since the landing of the Mayflower, Massachusetts has grown very rapidly and has multiplied its population eleven times since the first United States census in 1790. It ranks second in the United States in density of population. It is preponderantly urban in population as more than ninety per cent of the inhabitants dwell in the cities. There are more than 528 persons to the square mile according to the census of 1930. The total population of Massachusetts in that year was 4,249,614, nearly twenty-five per cent being foreign-born whites, and a little more than one per cent Negroes. Boston had a population of 781,188 inhabitants in 1930. There are seven other cities in the State having more than 100,000 inhabitants. These important cities are: Worcester, 195,311; Springfield, 149,900; Fall River, 115,274; Cambridge, 113,643; New Bedford, 112,597; Somerville, 103,908; Lynn, 102,320, and Lowell, 100,234.

The Roman Catholic Church is the largest single denomination in the State, having a membership of 1,629,424. Jewish congregations have a membership of 213,085, and Congregationalists rank third with 159,252 members. There is a total membership of 2,500,204 in all religious bodies of the State.

Education. Massachusetts has excellent educational facilities. The percentage of illiteracy, which has been low until recent years, has been increased to 3.5 per cent by an influx of foreigners. Education is compulsory in the State between the ages of seven and fourteen. There were 760,208 pupils enrolled under 26,402 teachers in the elementary schools during the school year 1930-31, and 135,880 pupils under 5,896 teachers in the 249 high schools of the State during that same year.

A department of University Extension was created by an act of the State legislature in 1915, which provided for educational extension courses under the direction of the State Board of Education. There were 440,409 students enrolled between January 1916, and December 1931. This board is appointed by the governor, but exercises no direct control over the local boards except in a general way. It promotes all educational matters, distributes the income of the State's school fund and directly manages the State's normal schools, of which there are ten. In 1930-31 these teacher's training schools enrolled 2,568 pupils and maintained a faculty of 212 teachers. The State Normal Art School at Boston is maintained for those teachers specializing in drawing and designing.

Massachusetts ranks high in the number of colleges and universities which are well known for their superior scholastic training. Several of these institutions are more than one hundred years old. Harvard University, the oldest college in the Western Hemisphere, was founded in 1636. Other educational institutions of higher learning are Boston University with schools of art, music, agriculture, law, theology and medicine; Clark University at Worcester for graduate students; Holy Cross College located in the same city; Massachusetts Institute of Technology; Massachusetts Agricultural College at Amherst; Andover Theological Seminary; Amherst; Williams; Tufts, and Boston College, the latter a Catholic institution.

Two schools receive State aid, Lowell Textile institute at Lowell, and the Massachusetts Agricultural College at Amherst. All other institutions are under private control. Boston University has the largest enrollment of any institution in the State, with a student body (1932-33) of 11,360, and a faculty of 520 professors. Harvard had 8,227 students and 1,770 professors in 1933. Massachusetts is the mother State of four of the finest women's colleges in the United States, including Smith College at Northampton with 1,953 students and a faculty of 223; Radcliffe College at Cambridge with 990 students and a faculty of 300; Wellesley College at Wellesley with 1,530 students and a faculty of 172, and Mount Holyoke College at South Hadley with 1,006 students and a faculty of 119, all enrolled in the school year of 1932-33.

Splendid oppportunities are offered students of music and art in the New England Conservatory of Music at Boston, Art-Tile Works at Chelsea, Boston Museum of Fine Arts and many art schools throughout the State. There are over 500 public libraries, the larger ones being located at Boston, Worcester, Cambridge and Springfield. Large university libraries and a large reference library, called the Boston Athenæum also provide adequate reference facilities.

Government. The State legislative body under the name, General Court of Massachusetts, consists of a Senate with forty members and a House of Representatives with 240 members. The Senators are elected biennially by popular vote and the Representatives are elected in 159 districts, electing from one to three members according to the number of legal voters. This body was provided for in the State Constitution which was adopted in 1780. It convenes annually.

The executive department of the State is comprised of the Governor who is advised by a council of eight members, and the Lieutenant Governor, Secretary of State, Attorney-General, Treasurer, Auditor and Receiver-General. These offices are filled biennially.

The judiciary department includes a supreme court, superior court, probate court and courts of solvency. The justices receive their appointments from the governor.

Massachusetts is represented in the United States National Congress by two Senators and fifteen Representatives.

History. The earliest discovery of the land embraced in Massachusetts is thought to have been made by the Norsemen in the eleventh century. In 1407 the Cabots of England reached its coast. Exploration of the State was begun by Bartholomew Grisnold in 1602, and grants were made in the following year by the French in the patent "Acadie" to Sieur de Monts. The English established themselves in Massachusetts by the Charter of Virginia in 1606, and again by the Charter of New England in 1620. The landing of the Pilgrim Fathers at Plymouth, December 22, 1620, is the date of the first permanent settlement. The stone on which they landed is carefully guarded at Plymouth. Other settlements were made later, forming Massachusetts Bay Colony in 1628, and settling in the vicinity of Salem. The name of the State is derived from that given by the Indians meaning "at the Great Blue Hills." In 1684 the charter of Massachusetts was forfeited, and the Plymouth and Massachusetts Bay Colonies and the District of Maine were consolidated under a charter granted by the King in 1692, and ruled by a Governor appointed by him. From this time on down to the beginning of the American Revolutionary War, the colonists suffered and rebelled against the heavy taxation exacted by the English Crown. The first battles of the war were fought on the soil of Massachusetts at Lexington and Bunker Hill. The colony took an active and prominent part in the balance of the war and the development of the new government. The State opposed the nation entering the War of 1812, but loyally performed its duty when the war opened.

During the Civil War, Massachusetts again held out strongly against slavery and it was here that the abolitionist movement was begun. Garrison published the first number of the *Liberator* in Boston in 1831. When the war broke out, the State contributed liberally with men and money.

Massachusetts Indians. Massachusetts when first settled was occupied by five Algonquin tribes: the Pennacooks, the Massachusetts, the Nausets, the Pokanokets and the Nipmucks. These tribes were all friendly, save the Nausets, with whom Plymouth made a treaty of peace. Missions among the Indians were begun by the Mayhews of Martha's Vineyard in 1644 and by John Eliot two years later. After five years' work Eliot gathered "the praying Indians," as the converts were called, at Natick, and translated the Bible into their language. By 1674 the Christian Indians numbered 3,200. The next year King Philip's war broke out, which began with the rising of the Pokanokets under Philip, their chief, and spread to the Nipmucks, Massachusetts and Pennacooks. The frontier settlements were ravaged; the praying Indians were attacked by red men and by white men, and the savages were not conquered nor the war ended until the death of Philip in 1676. Many Indians were sent as slaves to the West Indies; the Pennacooks mostly joined tribes eastward or in Canada; the others quieted down and were given lands from time to time. They have since mostly intermarried with whites or Negroes, and now there are less than 100 full-blooded Indians in the State.

Massachusetts Institute of Technology was established at Cambridge, Massachusetts, in 1862 to further the study of industrial science. Its expenses are met partly by endowment, partly by fees, and partly by gifts from the State of Massachusetts and from the United States. Its students numbered, in 1932, 2,831, and its faculty, 529. The institute combines a liberal education in art and science with technical education in the direction of a given profession. It has fifteen distinct courses leading to degrees of Bachelor, Master and Doctor of Science. These courses include Civil, Mechanical, Electrical, Chemical, Mining Engineering, Architecture, Public Health and Engineering Administration. The institute holds property valued at $10,000,000.

Massasauga (*măs-ȧ-sô'gȧ*). See RATTLESNAKE.

Massasoit (*măs'sȧ-soit*), a chief of the Pokanoket or Wampanoag Indians, was born about 1580. He ruled over most of southern Massachusetts from Cape Cod to Narragansett Bay. His tribe, once some 30,000 in number, shortly before the landing of the English had lost all but about 300 by pestilence. In 1621, three months after Plymouth had been founded, Massasoit and sixty warriors, armed and painted, came to the settlement and made a treaty of peace. This treaty was kept for fifty years, and Massasoit always was friendly to the settlers. His home was where Warren, Rhode Island, now stands, and here he entertained Roger Williams for several weeks when on his way to Providence after being banished from Massachusetts. Massasoit was honest, kept his word and loved peace. He died in 1661. His son Pometacom, after his father's death, went to Plymouth and asked to be given an English name. He was named Philip, and became the leader in King Philip's war.

Masséna (*mȧ-sā-nȧ'*), **Andre,** the duke of Rivoli, prince of Essling and the greatest of Napoleon's marshals, was born at Nice, Italy, probably of Jewish parents, on May 6, 1758. He served for fourteen years in the Sardinian army. Early in the French Revolution he joined a battalion of volunteers, becoming a general of division in 1793. He distinguished himself greatly in the campaigns in upper Italy. After Jourdan's defeat at Stockach, in 1799, Masséna was given command of the army in Switzerland and by his crushing victory over Suvaroff's Russians at Zurich freed France from the danger of invasion. In 1804 he was made a marshal of the empire and commander of the army in Italy. He kept Archduke Charles of Austria in check, crushed him at Caldiero, and overran Naples. In the campaign of 1809 against Austria he commanded on the right bank of the Danube, and covered himself with glory at Landshut, Eckmühl and Ebersberg-on-Taun. In 1810 he was sent to Spain to drive out the English, and drove Wellington back upon his intrenchments at Torres Vedras. Finding it impossible to break the English lines and harassed by lack of supplies, he made a masterly retreat but was recalled in anger by Napoleon. He himself said his failure was owing to the disobedience of his captains Ney and Junot. He submitted to the Bourbons at their restoration, and was made a peer. He supported Napoleon during the Hundred Days. In strategy and tactics Masséna was like Napoleon in quickness and ability, and was brave and unwearied on the battlefield. He died at Paris on April 4, 1817.

Massenet, Jules Emile Frederic, a noted French composer, was born at Montaud (Loire) in 1842. He was educated at the Paris Conservatory. There he was awarded many prizes for his pianoforte playing and fugue writing. In 1878 he became professor of advanced composition at that Conservatory and served in that capacity until 1896. In 1898 he was also elected to the Academie des Beaux Arts. Massenet is perhaps best known for his operas, among which are *Manon* (1884); *Le Cid* (1885); *Thais* (1894); *Le Jongleur de Notre-Dame* (1902); *Don Quichotte* (1910), and *Roma* (1912).

Massillon (*măs′sĭl-lŏn* or *mä′sē′yôn′*), **Jean Baptiste,** one of the greatest of French clerics and modern orators, was born at Hyères in Provence on June 24, 1663. He first preached before Louis XIV in 1699. It was to him that the king said: "I have heard great orators in my chapel and have felt satisfied with them, but every time I have heard you I have felt dissatisfied with myself"— a saying which shows the fearless eloquence of this great orator. In 1717 Massillon was made bishop of Clermont, and next year preached his famous series of ten short sermons for Lent before young King Louis XV. He died on Sept. 18, 1742. Bossuet and Bourdaloue rival him in oratory, but he was a greater preacher than either. Among his masterpieces are his sermons on the *Prodigal Son*, the *Death of the Just and the Unjust* and *For Christmas*.

Massillon (*măs′sĭl-lŏn*), **O.,** a city in Stark County, northeastern Ohio, on Tuscarawas River, the Ohio Canal and the Wheeling and Lake Erie, Pennsylvania and Cleveland, Lorain and Wheeling railroads. It lies 65 miles south of Cleveland in a good wheat-growing, coal-mining, stone-quarrying belt. It has many industries including iron-bridge, agricultural-implement and threshing-machine works; paper, flour, and rolling-mills; sandstone quarries and glass-works. It possesses good public schools, churches, banks and public buildings. Population 21,000.

Mas′tiff. See Dog.

Mas′todon, a large fossil elephant, remains of which are found abundantly in marshes and bogs in Europe and America. In Kentucky the bones of 100 mastodons and 20 elephants were dug out of one bog. They have been found abundantly in New York, New Jersey, Indiana and Missouri. Several very perfect specimens have been obtained from New York. Their bones are more massive than those of the elephant. The mastodons were very large, being 12 or 13 feet high and, including the tusks, 24 or 25 feet long. Their grinding-teeth were provided with large, rounded points like nipples, whence the name mastodon (Greek, *mastos*, the breast, nipple, and *odous*, tooth). Twigs of spruce and fir have been found lodged in the teeth and in considerable masses within the ribs where the stomach was situated. They seem to have become extinct in Europe at the close of the tertiary period, while in America they lived through the quaternary in association with primitive elephants. During the latter period of geological time these huge beasts roamed in herds over North America, from the Gulf to the Arctic regions, in company with other representatives of the elephant. Fossil remains of a pygmy elephant have been found in Malta. See Mammoth.

Matabeleland (*măt′ȧ-bē′lē-lănd*), is the name given to an indefinite region lying north of Transvaal and estimated to contain over 60,000 square miles. North of it lies Mashonaland (*q. v.*); east of it, Portuguese East Africa; and west of it German Southwest Africa. Zambezi River may be considered its northwest boundary. It used to be described as part of Kafraria; but now it forms a part of Rhodesia (See Rhodesia). Its population is supposed to be 208,000 natives and about 10,000 Europeans. Its plateaus are well-adapted to agriculture and admirably fitted for European settlement. It is rich in mineral resources. Over 13,000,000 acres have been surveyed; even a geodetic survey has been completed; and at Bulawayo, the capital, there are hotels, banks, government offices, public libraries, hospitals, churches and schools. Two or more newspapers are published here. Bulawayo also is the center of considerable railway building, a line connecting it with Vryburg on the south, opened in 1897; and a section extending 150 miles to the north would have been opened in 1900 but for the war in the Transvaal. A line is laid out through Gwelo to the Zambezi and northward toward Lake Tanganyika. The native population is a branch of the Zulus, physically among the finest of the African races. They formerly lived in Natal, afterward occupying part of Transvaal, but removed to their present site in 1827. In 1879 the British broke up the confederacy of the Zulus by a hard-fought war; and in 1893 the South Africa Company gave the Matabele a crushing and decisive defeat from which they have never recovered. Matabeleland, on account of its fertile soil, temperate climate and mineral resources, promises to be one of the most important links in the colonies which Great Britain has planted from the Mediterranean to the Cape of Good Hope.

Matamoros (*măt′ȧ-mō′rōs*), **Mariano,** a Mexican priest and patriot. Nothing is known of the time of his birth or of his early life. At the Mexican revolution (1811) he was parish priest of Jantelolco, a village south of Mexico. Here he was threatened by royalist troops and fled to Izucas, where he joined the rebels. Their chief, Morelos, at once made him a colonel, and he quickly became a popular leader and an able officer. He took part in the expedition to Oajaca, and won the victory of San Augustin del Palmar. The revolution had now triumphed over all Mexico, except in a few of the larger cities, but the cause was endangered by Morelos' hasty attack on Valladolid and rash battle of Puruaran. In this battle Matamoros was captured, and he was speedily executed, Feb. 3, 1814. The temporary failure of Mexican independence was probably due to the death of this patriot, whose memory is highly honored by the Mexicans.

Matanzas (*mȧ-tăn′zas*), a fortified town and seaport on the northern coast of Cuba.

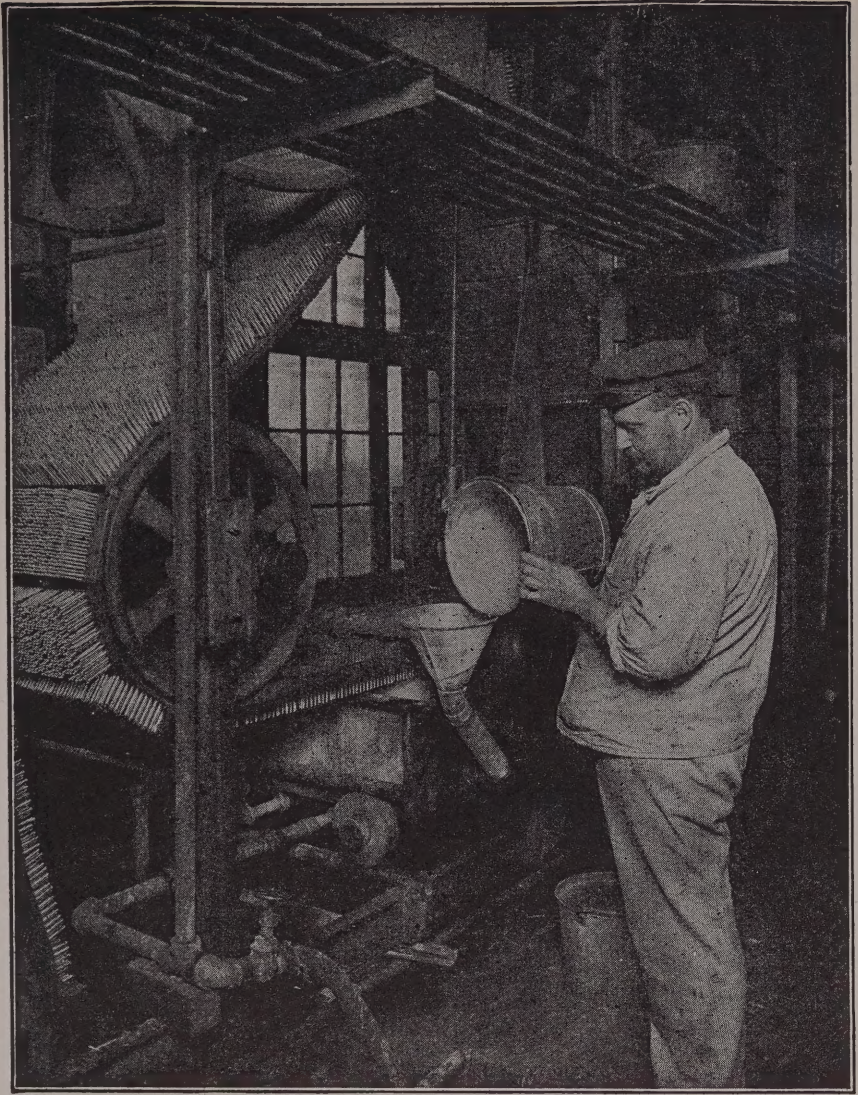
55 miles by rail east of Havana. It is the third largest city in Cuba, in a very rich district, with a good harbor. It has a large trade in sugar, molasses, rum and cigars, and has distilleries and iron-foundries. Population 64,385.

Mat′aped″iac River, Quebec, famous among anglers on account of its magnificent salmon-fishing, flows out of Lake Matapediac, 13 miles by one and a half miles, and empties into the Restigouche some 18 miles above Campbelton. The territory watered by the river and its tributaries is about 1,300 square miles. All the rich valley is abundantly watered by rivers and streams, and valuable waterpowers abound. The Intercolonial Railroad for 40 miles skirts the river, putting the settlers into direct communication with Quebec, Montreal, St. John, N. B., and Halifax.

Match′es, splints of wood tipped with some composition (usually containing phosphorus) to produce light by friction. They came into general use about 1834. Before that time light was produced by striking steel with a flint and catching the sparks on tinder (charred cotton). A flame was obtained by touching the burning tinder with punk or with a strip of wood tipped with sulphur. Savage races sometimes obtain light by rubbing two bits of wood together. Other devices employed formerly were a lens to concentrate the sun's rays on some inflammable substance; a lamp for producing a jet of hydrogen gas and kindling it by making it play on spongy platinum; a splint tipped with a mixture of chlorate of potash and sugar, which took fire on contact with sulphuric acid; and the lucifer match, invented 75 years ago, tipped with a paste of chemicals, which would take fire when drawn with a good deal of pressure across sandpaper. Phosphorus, introduced in 1834, was a great improvement. The chief operations in the manufacture of matches are cutting the wood-splints; immersing the splints in melted paraffine or sometimes in sulphur; and preparing the igniting composition and dipping the splints into it. Matches are made of pine or aspen. The wood is sawed into blocks, which are then forced endwise through thick, steel plates full of little holes with sharp edges and just the size of a match. The splints thus formed are then fed by thousands to dipping-frames by filling-machines (of which there are several kinds and of American invention). In the dipping-room the igniting composition is spread on a hollow, iron table kept hot by steam, and the splints are dipped into it. Nearly every manufacturer has his own special mixture for the dipping of matches, and phosphorus is an important element in all of them; but in the case of so-called safety-matches there is phosphorus only on the prepared surface upon which they are ignited. The use of white or yellow phosphorus for matches is now prohibited because of its poisonous qualities.

Math′er, Cotton, son of Increase Mather, was born at Boston, Feb. 12, 1663. He graduated at Harvard in 1678. When only 14 he began a system of fasts, which he kept up all his life. Wishing to enter the ministry, he conquered an impediment of speech and became his father's assistant in North Church, Boston. He was much interested in civil affairs, and drew up the declaration of the colonists justifying the imprisonment of Governor Andros. In 1685 appeared his *Memorable Providences Relating to Witchcraft and Possessions*, which was used as an authority in the Salem witch-trials. In 1688 the children of John Goodwin were suspected of being visited by the devil, and Mather with three other ministers held a day of fasting and prayer over the cases. His *Wonders of the Invisible World* was written to prove the reality of witchcraft. He and his books did much to fan the madness. Though the main body of the colonists shared his belief, none equaled him in zeal, and on his head rests the heaviest burden. Afterward he confessed that "there had been a going too far in that affair." But Mather did no worse than the best and most learned men of Christendom, from Pope Innocent VIII to Sir Matthew Hale. His industry and learning were remarkable, and he published 382 books. Of these the chief is *Magnalia Christi Americana*. a mass of materials for the church-history of New England. His *Essays to Do Good* were much liked by Franklin. Mather died on Feb. 13, 1728. See Upham's *History of the Salem Delusion* and Poole's *Cotton Mather and Salem Witchcraft*.

Mather, Increase, was born at Dorchester, Mass., on June 21, 1639. He graduated at Harvard in 1656 and at Trinity College, Dublin, two years later. He entered the ministry and preached in Devonshire and Guernsey before going back to America. From 1664 until his death he was pastor of North Church, Boston. From 1685 to 1701 he was president of Harvard College, and was the first minister in America to receive the degree of doctor of divinity. When Charles II annulled the charter of the colony (1684), Mather was sent to England as the agent of Massachusetts. Unable to get the old charter restored, he took back a new one (1692), under which the naming of the crown-officers was left to him. A day of thanksgiving was appointed for his safe return and the success of his mission. Mather studied 16 hours a day, always gave a tenth of his income in charity, and in every way was a man of careful habits. He also was one of the earliest of American writers. Of his many works perhaps the best known is his *Remark-*



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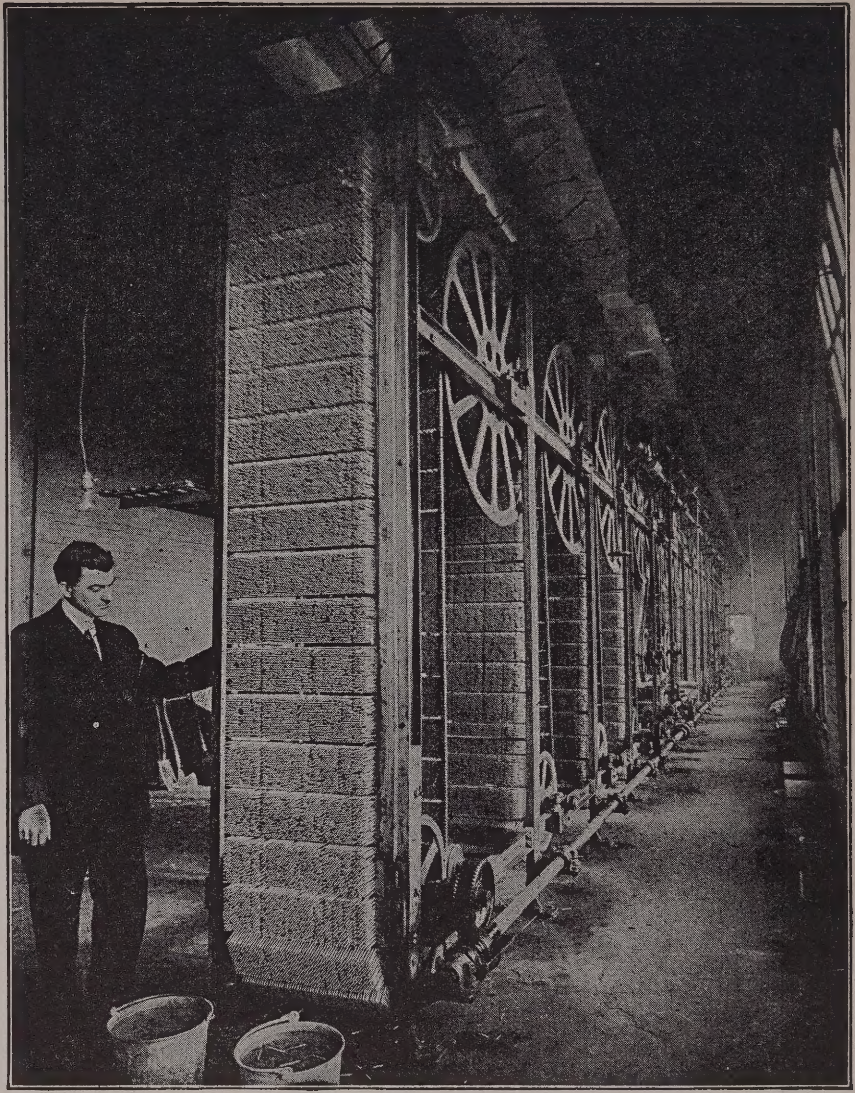
In this picture we see a man pouring the composition into the dipping tank. You can see the tank which contains the composition and just above it the trays of matches on a revolving belt, moving over the tank so that the tip ends of the matches are dipped in the composition. They are then carried by the belt up into a blast of cold air which quickly dries the heads.



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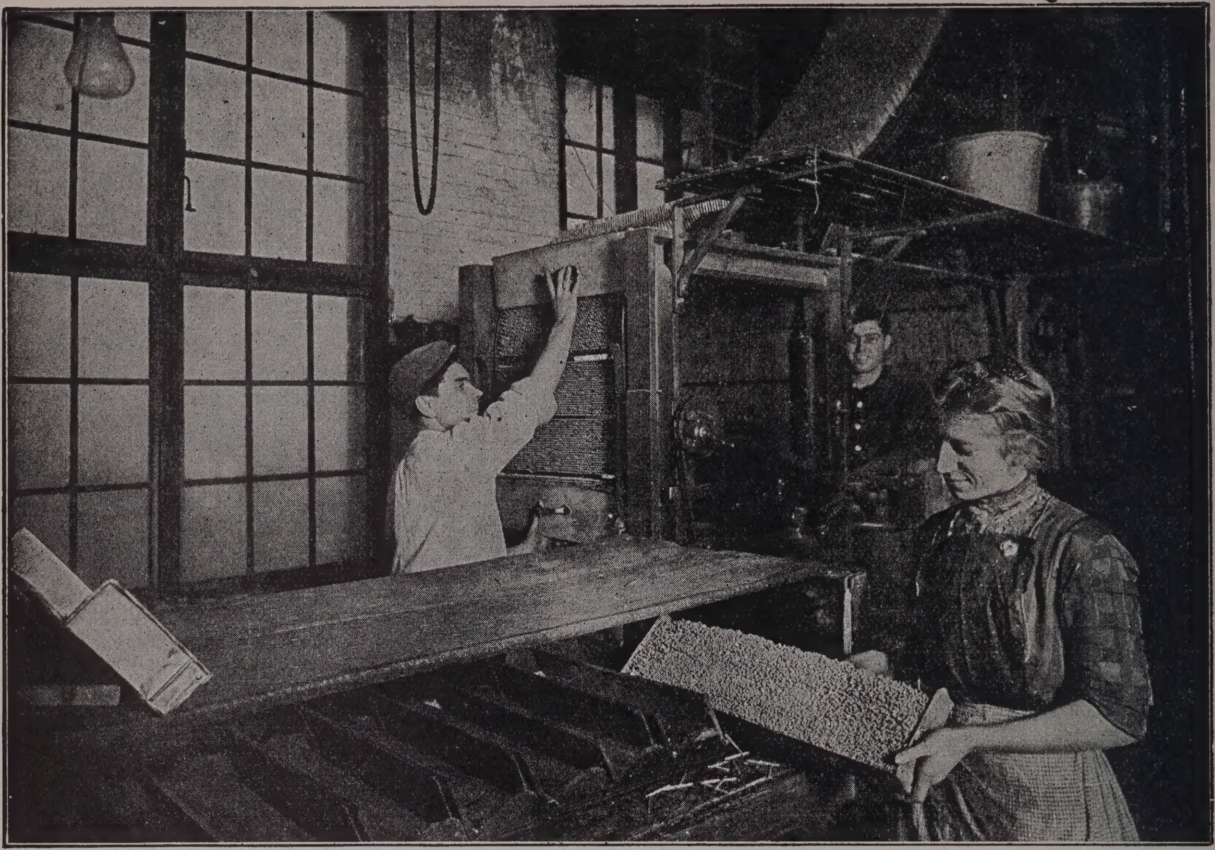
Here is a dipping machine which holds one million matches. It is officially known as the fastest machine in the world. It takes forty minutes to turn out a million matches.



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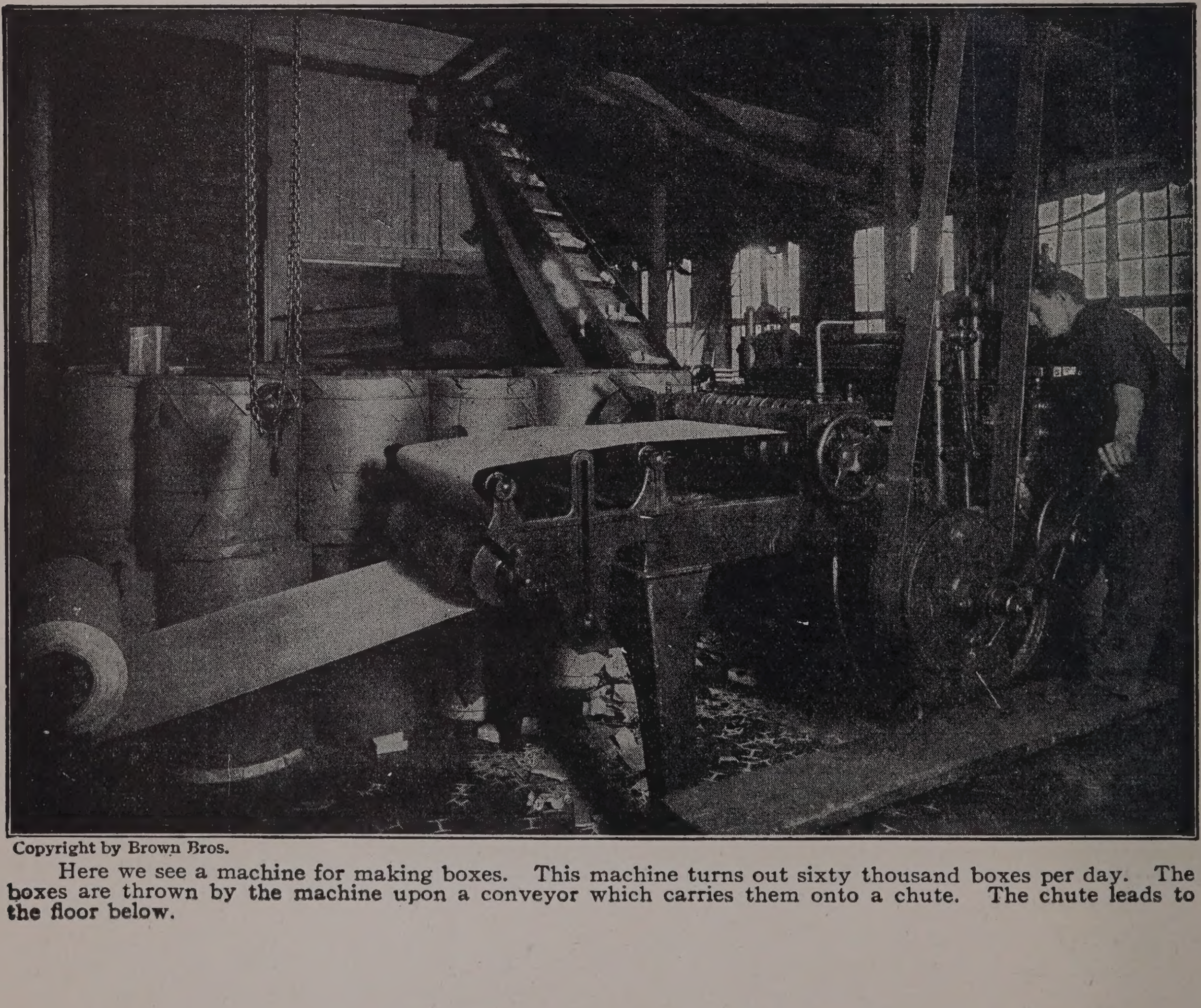
This picture shows a man taking the trays of completed matches from the belt of the dipping machine The girl then takes them into the packing room.



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Here we see a machine for making boxes. This machine turns out sixty thousand boxes per day. The boxes are thrown by the machine upon a conveyor which carries them onto a chute. The chute leads to the floor below.

able Providences. He died on Aug. 23, 1723.

Math'eson, Most Reverend Samuel P., was born in 1852, and studied at St. John's, Manitoba. He was ordained in 1875, and in 1882 became professor of exegetical theology and dean of St. John's Cathedral, Winnipeg. He was treasurer of St. John's in 1889, dean of Rupertsland in 1902, and prolocutor of the general synod of Canada in the same year. He was consecrated bishop administrator of Rupertsland in 1903, archbishop in 1905. The whole of the Hudson Bay country (or Prince Rupert's Land) was at one time included in this diocese. It was erected into a see in 1849, the Hudson Bay Company contributing to its funds. Eight dioceses have been formed out of this since 1872.

Math'ew, Theobald, commonly known as Father Mathew, the Irish apostle of temperance, was born at Thomastown, Tipperary, Oct. 10, 1790. He studied for the priesthood and entered the order of the Capuchins. As a Capuchin father at Cork, he found that the poverty and wretchedness of his people were in great measure due to overdrinking, and he became an earnest preacher of total abstinence. His crusade, begun in 1838, soon spread to Dublin, Liverpool, Manchester, London, Glasgow, New York and wherever there were Irishmen. His success was marvelous. During his last years his unthinking charity brought him to poverty, and Father Mathew died at Queenstown, worn out by his labors, Dec. 8, 1856. See Harriet Martineau's *Biographical Sketches* and his *Life* by F. J. Mathew.

Math'ieu, Olivier Elzear, was born at St. Rock, Quebec, Dec. 24, 1853. He studied at Quebec Seminary and was granted the doctorate of theology on May 18, 1878. Soon after he was ordained and became professor of philosophy at Laval University, a position which he still holds. In 1882 he went to Rome where he obtained the degrees of doctor in philosophy and doctor in scholastic science (St. Thomas). Returning to Quebec, he occupied the position of prefect of studies in the Junior Seminary during six years and afterwards that of director during eleven years. In 1899 he was appointed superior of Quebec Seminary and rector of Laval University, continuing to occupy his professor's chair. In 1903, on the occasion of the fiftieth anniversary of the foundation of Laval University, he was appointed apostolic prothonotary, with the title of Monsignor. As student and professor of philosophy, Monsignor Mathieu stands in the first rank of American thinkers. As educator, no man has exercised greater or more beneficial influence in Quebec.

Matsys (*măt'sĭs'*), **Quentin,** Flemish painter, was born at Louvain, Belgium, about 1466, and is said to have first been a blacksmith. He settled at Antwerp in 1491 and there died in 1530 or 1531. His pictures are mostly religious, and are remarkable for glow of color, absence of light and shade and fine finish. The *Burial of Christ, Martyrdom of John the Baptist* and *The Money-Changers* are among his best pictures. Matsys also ranks high as a portrait-painter. He seems to have been acquainted with Holbein, Dürer, Erasmus, Sir Thomas More and other noted men of the time.

Matterhorn (*măt'tẽr-hôrn*), called by the French Mont Cervin and by the Italians Monte Silvio, is a peak of the Alps in the Swiss canton of Valais and Piedmont, which rises 14,705 feet. The peak was first scaled by four Englishmen and three guides, July 14, 1865, when two of the party fell over the precipice and were killed. See Whymper's *Ascent of the Matterhorn.*

Matth'ew (meaning *Gift of Jehovah*), one of the apostles and held to be the author of the first Gospel. He was a publican or tax-gatherer at Capernaum, when called by Jesus to follow him. Except in the four lists of the disciples, Matthew is nowhere mentioned by name in the New Testament. An early authority speaks of his having died a natural death; by other writers he is said to have suffered martyrdom after preaching in Parthia and Ethiopia. Papias, a bishop of the second century, tells us that "Matthew wrote in the Hebrew dialect a collection of the sayings of the Lord, and each one interpreted them as best he could."

Matthews (*măth'ūz*), **James Brander,** an American author and professor, was born at New Orleans, La., Feb. 21, 1852. He graduated at Columbia College in 1871; took the degree of bachelor of laws in 1873; and was soon after admitted to the bar. He, however, preferred literary pursuits and gave his whole attention to authorship, becoming one of the founders of the Authors' Club. He has published over 30 separate volumes, edited many editions of popular works, and contributed numberless articles to periodicals. Since 1892 he has filled the chair of literature at the college of his graduation. His best-known works are *Americanisms and Briticisms, Vignettes of Manhattan, Introduction to the Study of American Literature* and *Parts of Speech.*

Mattoon (*măt'to͞on'*), **Ill.,** city in Coles County about 75 miles south of Springfield. It is in an agricultural region of which broom-corn is one of the principal products. Its chief manufacturing establishments are broom-factories, flour-mills, grain-elevators, wagon and carriage factories, foundries, machine-shops and repair-shops for several railroads. Some of its noteworthy buildings are the Old Folks' Home and the public library. The city has good public and parochial schools, several churches and the services of three railroads. Population, 16,000.

Mauch Chunk (*mạk' chŭnk'*), a mining town of Pennsylvania. lies among picturesque hills on the Lehigh, 90 miles northwest of Philadelphia There is a switchback railroad, nine miles long, from the town to Summit Hill, famous for its burning mines, which have been on fire since 1832 and perhaps longer. Population 3,969.

Mauna Kea (*mou'nă kā'ă*) on the island of Hawaii, the highest mountain in the Hawaiian Islands and in Polynesia, rises 13,803 feet above the sea. It is a volcanic dome, and its craters have not long ceased their eruptions. Its top is covered with snow most of the year, and herds of wild cattle roam in the woods that cover the mountain-side.

Mauna Loa (*mou'nă lō'ă*), a volcanic mountain of Hawaii, 13,760 feet in height. It is wholly made up of lava that has been thrown out in a fluid state. It is a smooth, regular dome with forests on its flanks at an elevation of 5,000 feet. It has many craters near the top and on the sides, and new ones sometimes open. The top crater, called Mokuaweo-weo, is round, 8,000 feet across and about 1,000 feet deep. The eruptions often are like lava-fountains, spouting from the top of the mountain. In 1859 one of these fountains for four or five days sent up a stream of white-hot, fluid lava, about 200 feet through and 200 or 300 feet high, lighting the horizon for 150 miles. In 1868 the lavas forced their way for 20 miles underground, and then burst through a fissure two miles long. Here four fountains spouted, sometimes joining in one fountain two miles in length, throwing up crimson lava and red-hot bricks 500 or 600 feet.

Maurice (*mạ'rĭs*) or, in German, **Moritz,** Elector of Saxony, a German general, was born at Freiberg, Saxony, March 21, 1521. In 1542 he fought under Emperor Charles V against the Turks and next year against the French. He also fought with Charles at Mühlberg in 1547, in which the Smalkald league of German Protestant princes was defeated, though its two leaders were his father-in-law, Philip, Landgrave of Hesse, and his cousin, John Frederick, Elector of Saxony. Though John Frederick's dominions and title were given to Maurice, the fact that he himself was a Protestant, together with Charles' treacherous arrest of the landgrave and other despotic acts, soon cooled his devotion to the emperor. He raised an army and forced from the great emperor not only the release of Philip of Hesse, but the treaty of Passau, July 16, 1552, which granted the fullest liberty of worship to Protestants. Next year Maurice headed a league against the margrave, Albert of Brandenburg, who would not acknowledge this treaty, and crushed him at the battle of Sievershausen, near Hannover, but was himself wounded and died two days later, July 11, 1553.

Maurice (*mạ'rĭs*), **Prince of Orange** and **Count of Nassau,** one of the most skillful generals of his age, was the son of William the Silent, and was born at Dillenburg, northern Germany, Nov. 14, 1567. After his father's assassination in 1584. the provinces of Holland and Zealand and, afterwards, Utrecht and the other Netherland provinces chose him as their stadtholder. A great part of the Netherlands was still in the hands of the Spaniards; but under the leadership of Maurice the Dutch rapidly wrested cities and fortresses from their enemies. In 1597 he defeated the Spaniards at Turnhout, and in 1600 crushed them at Nieuwport. Then for more than three years he baffled the whole power of Spain by his defense of Ostend. At last, in 1609, Spain reluctantly acknowledged the United Provinces a free republic. A factional fight between the Orange party and the Remonstrants, led by Olden-Barneveldt, was not ended by the victory of the former party till 1621. At once Maurice renewed the war with Spain. He died at The Hague on April 23, 1625.

Mauritania. See MOROCCO.

Mauritanié, the Gallicized name of ancient Morocco, is now applied by the French to the protectorate established by them in 1903 over the Moorish tribes of Trarza and Brakna north of the lower Senegal. The boundaries are undefined, with the probability that they will eventually include much or all of the territory between the French colony of Senegal and Spanish Africa. A provisional government, military and civil, has been formed, responsible to the governor-general of French West Africa.

Mauritius (*mạ-rĭsh'ĭ-ŭs*) or **Isle of France,** an island and British colony in the Indian Ocean, 500 miles east of Madagascar. It is of volcanic formation. The surface is a tableland rising into ridges 500 to 2,700 feet high, the highest peak, Rivière Noire, being 2,711 feet above sea-level. Lava, basalt and volcanic lakes occur. The picturesque beauty of the Isle of France, as the French called it, covered with forests, is described in St. Pierre's *Paul and Virginia* and Besant and Rice's *My Little Girl.* But in the 19th century the woods were cut down to make room for sugar-cane plantations. Among the native trees are the ebony, cocoanut palm, bamboo, benzoin, ironwood and traveler's tree. There are many tropical fruits, besides food-plants, as sugar, vanilla, coffee, cocoa, corn, rice, yams and manioc. Terrific cyclones are common. The educated upper classes are mostly descendants of the French colonists. There are many primary and secondary schools and a royal college. There are a number of negroes, Malagasi, Singhalese, Malays and Chinese; but the bulk of the people are coolies, who have been brought in nearly every year since 1842 to work the sugar-fields. The capital is Port Louis (population 52,740). The island is passing into the hands of Chinese and Hindus, who are supplanting Europeans as owners as well as workers. The great crop is sugar, though large quantities of rum, cocoanut-oil, vanilla, Mauritius hemp, aloe-fiber, drugs and caoutchouc are exported. Mauritius is a British colony, and is ruled by a governor and executive council. The island was discovered by Mascarenhas in 1501, who found it uninhabited. The Portuguese abandoned it, and it was seized by the Dutch in 1598, who named it after their Prince Maurice; but they in turn abandoned it in 1710. The French were its next masters, and introduced sugar-raising, which made its prosperity. The English gained possession in 1810. There are 121 miles of railway and 333 of telegraph. There is a cable through the Seychelles Islands to Zanzibar. Its exports in 1905 reached a total value of 34½ million rupees, and its imports were 18 million. The area of the island is 705 square miles. Population, including about 3,000 military (in barracks) and non-resident, shipping people, 378,195. Among the dependencies of Mauritius are Rodrigues (3,162) and a number of smaller islands in the group. See works by J. G. Baker and G. Clark and Keller's *Madagascar, Mauritius and other East African Islands.*

Maury (*ma'rĭ*), **Matthew F.**, an American naval officer and scientist, was born near Fredericksburg, Va., Jan. 14, 1806. In 1825 he entered the navy as midshipman, and while still a passed-midshipman he began his *Treatise on Navigation*, which was used as a text-book in the navy. After 13 years' service he became lieutenant, in 1837, but two years later an accident lamed him for life and unfitted him for service afloat. In 1842 he was made superintendent of the hydrographical office at Washington and, two years later, of the observatory. Here he made careful observations on winds and currents, from the results of which he wrote his *Physical Geography of the Sea, The Gulf Stream, Ocean Currents* and *Great-Circle Sailing.* Maury was made a commander in 1855, but when his state seceded he joined the Confederate navy. After the war he was professor of physics in Virginia Military Institute, Lexington. He was a member of the scientific societies of Europe, and practically was the founder of the new and important science of hydrography. Professor Maury died at Lexington, Va., Feb. 1, 1873. See his *Life* by his daughter.

Max'im, Sir Hiram S., American inventor, was born in Maine, Feb. 5, 1840, and became famous as the inventor of the automatic cannon (*q. v.*) known by his name. His first completed gun was exhibited in 1884. The principle of this gun was making the recoil of the weapon load and fire the weapon. He succeeded in making a gun that would fire 600 shots a minute. The gun was first used in actual warfare by the British in Matabeleland. It was soon adopted by the French navy, and now, under various names, is in use by all governments. He also invented a smokeless powder (*q. v.*), incandescent lamps and searchlights to be used on board of men-of-war. He received a number of decorations from European courts. He was also made a member of many scientific associations. He resided in England, and having transferred his citizenship to that country was knighted in 1901. He died in 1916.

Maximilian (*măks'ĭ-mĭl'yan*) **I**, German emperor, the son of Frederick III, was born at Neustadt, near Vienna, March 22, 1459. When only 19 he married Mary, the heiress of Charles the Bold, by whom he gained Burgundy and Flanders. But this brought him into war with Louis XI of France, and Maximilian was forced to give Artois and Burgundy to Louis. In 1486 he was chosen king of the Romans. In 1490 he drove out the Hungarians, who, under Matthias Corvinus, had seized a great part of the Austrian territories on the Danube, and at Villach in 1492 he routed the Turks. The death of his father in 1493 made Maximilian emperor. His marriage with the daughter of the duke of Milan turned his ambition toward Italy; but after many changes of fortune he was driven to give up Milan to France and Verona to the Venetians. He, however, gained Tyrol by peaceful means; the houses of Spain and Hapsburg were joined by the marriage of their children, and the marriage of his grandson, Ferdinand, brought Hungary and Bohemia to Austria. Maximilian ended the feuds of his nobles, improved the courts, and divided the empire into six (afterward into ten) circles, each ruled by a governor. He also encouraged the Universities of Vienna and Ingoldstadt in learning and arts generally. He was well-educated, skilled in all bodily exercises, chivalrous and genial; so that he has been called the first knight of his age. Maximilian died emperor of the Holy Roman Empire, at Wels in Upper Austria, Jan. 12, 1519. See Coxe's *History of the House of Austria.*

Maximilian, Emperor of Mexico. Ferdinand Maximilian Joseph, archduke of Austria, was born on July 6, 1832, at Vienna, and was the younger brother of Francis Joseph I. He became an admiral of the Austrian navy, and in 1857–59 he was popular as governor of the Lombardo-Venetian territory. In 1862 the French interfered in the affairs of Mexico, and next year called together an assembly of notables, which offered the crown to Maximilian. After carefully reviewing the offer he accepted it, and in June, 1864, he entered Mexico. For a time all went well, but he was unable to keep the Mexican parties at peace. Juarez, the republican leader, again raised the standard of independence; and soon after (1866) Louis Napoleon was forced to think of withdrawing his troops. In vain the Empress Charlotte went to Europe to enlist aid for her husband; her reason gave way under the strain of excitement and grief brought on by disappointment. When the French withdrew, Maximilian felt bound in honor to stay and share the fate of his followers. At the head of 8,000 men he made a brave defense of Querétaro against a republican army under Escobedo. In May, 1867, he was betrayed and tried by court-martial, and on July 19 he was shot. His death was directly due to his own fatal edict of Oct. 3, 1865, that all Mexicans taken in arms against the empire should be shot without trial. See Kendall's *Mexico under Maximilian.*

Max'well, James Clerk-, a very remarkable English physicist and one of the most brilliant and profound minds known to the history of physical science. He was born at Edinburgh, June 13, 1831, and there received his early training, first at the Edinburgh Academy and afterward at the University of Edinburgh. In 1850 he went to Cambridge, from which he graduated in 1854. From 1856 to 1860 he held the chair of physics in Marischal College, Aberdeen, and for the next eight years a corresponding position in King's College, London. Three years of retirement on his estate at Glenlair intervened between his London residence and his acceptance of the newly created chair of experimental physics at Cambridge, where he lived and worked almost to his death in 1879. Genius showed itself very early in his career; for at 15 a paper of his on a mechanical method of drawing Cartesian ovals was considered worthy of presentation to the Royal Society of Edinburgh. His first great memoir was that which he offered in successful competition for the Adams prize in 1859. In this paper he proved from purely dynamical grounds that the rings of Saturn are made of discrete particles, else those rings would not be stable. His investigations on the *Kinetic Theory of Gases* placed him with Bernoulli, Clausius and Boltzmann as a founder of that science. Towering above everything else, however, is his *Electromagnetic Theory.* His work began with a paper on *Faraday's Lines of Force,* which he later so extended and perfected that in his *Treatise on Electricity and Magnetism* we have a complete theory of the entire subject from Faraday's standpoint, that is, from the point of view which replaces all action at a distance by action through a medium. Ever since its publication in 1873 this has been the standard treatment of electricity either in English or in any other language.

As early as 1864 Maxwell predicted that electrical vibrations, if they could be produced, would have the same properties as light-vibrations. It was not until 1888, nearly 20 years after Maxwell's death, that Hertz showed how to realize these electric oscillations in the laboratory and proved that Maxwell's equations had predicted the exact truth. These are precisely the electrical vibrations which Marconi and others have employed since 1896 in wireless telegraphy. This discovery of Maxwell's may be stated more simply, perhaps, by saying that he showed that *optics* is merely one department of *electricity.*

His two small volumes on *Matter and Motion* and the *Theory of Heat* are marvels of elegance, conciseness and clearness. They should be read by everyone who wishes to know the man. His collected *Scientific Papers* have recently been published by the Cambridge Press.

Even this brief sketch would be incomplete without adding that, aside from scientific attainments, his modesty, genial humor and high Christian character endeared him to everyone who knew him. A more charming biography than the *Life of James Clerk-Maxwell,* by his friends Louis Campbell and William Garnett would be difficult to find.

Maxwell, William Henry, a prominent American educator, since 1898 superintendent of public schools in New York City, was born in Ireland in 1852. He was educated at the College of Belfast and Galway and at Queen's University, taking his A. B. in 1872 and his A. M. in 1874. In 1874 he emigrated to the United States; and from 1882 to 1898 he superintended the Brooklyn public schools. As superintendent of the New York public schools Mr Maxwell has made indomitable efforts to keep the march of educational facilities apace with the wonderful growth of New York City. In 1901 he was made an honorary LL. D. by Columbia University. In 1904–05 he was president of the National Education Association. He is the author and editor of several textbooks for schools; and many of his short papers and addresses are printed in the proceedings of the N. E. A. (see *Index,* 1906) and in educational magazines. See, also, the annual reports of the superintendent of schools, New York City.

May, the fifth month of the year. The first of May has always been a gala day. The May festival goes back to the Floralia festival of the Romans, which probably came in the first place from India. In England, as we learn from Chaucer and Shakespeare, it was customary during the middle ages for all, both high and low — even the court itself — to go out on the first May morning at an early hour "to fetch the flowers fresh." The fairest maid of the village was crowned with flowers as Queen of the May. Every town and village, too, had its fixed pole — called the Maypole — on which each May-morning were hung wreaths of flowers, and round which the people danced in rings most of the day. Roman Catholics celebrate the month as the Virgin's month.

Mayence (*mȧ'yŏns'*) or **Mainz** (*mīnts*), the capital and largest town of the grand-duchy of Rhenish Hesse, Germany, on the Rhine, near its union with the Main. It is a fortified city, with double wall, bastions, outworks and a citadel in the center, and commands both sides of the river. There is a monument to Gutenberg, with a statue by Thorwaldsen and a bronze statue of Schiller in the public squares. The house in which Gutenberg was born still stands, as does the one where he had his first printing-press. Mayence is an old city, having been a place of importance under the Romans. It was the head of the league of Rhenish towns in the 13th century, and through Gutenberg became the bookmaking center. In 1801 it belonged to France, but in 1816 was assigned to Hesse-Darmstadt. Since 1871 it has been a fortress of the German empire. Population 110,634.

May″flow′er, the name of the vessel which in 1620 brought the Pilgrim Fathers from Southampton, England, to Plymouth Rock, Mass., has become a historic word in America. The little vessel was of only 180 tons burden. She arrived at her destination on the 21st of December, 1620. A society of the Mayflower Descendants, now having some 2,000 members, was formed in 1894. The Pilgrims were Congregationalists or Independents in search of a land where they might have full liberty of conscience.

Mayotta or **Mayotte** (*mȧ'yŏt'tȧ*) is the chief of the Comoro or Comore Islands, midway between the northern tip of Madagascar and the Mozambique coast, the more important of the others being Grande Comore, Moheli and Anjouan, with a total area of 620 square miles and a population of 47,000, of which Mayotte has 140 square miles and 11,640 inhabitants.

Mazarin (*mī'zȧ'răn'*), **Jules,** cardinal and chief minister of France during the youth of Louis XIV, was born on July 14, 1602, at Piscina, Italy. His ability for diplomacy was early seen, and he accompanied a papal legate to the court of France. Here he met Richelieu, who, foreseeing his future, engaged him to further French interests in Italy. In 1639 he openly entered the service of Louis XIII, was naturalized a Frenchman, and through Richelieu's influence gained a cardinal's hat. Richelieu further, before his death, recommended Mazarin to the king as his successor. He ruled with less friction than Richelieu, though with almost as great power. The opposition of parliament to his taxes, followed by the arrest of the leaders, brought on the first of the wars of the Fronde. When he had Condé and Conti arrested in 1650, he had to go into exile. He now saw his mistake in separating himself and the queen from every party in the state, and bent all his masterly powers to form a new royal party. In 1653 Mazarin came back in triumph, and from that time his power was reestablished, while he quickly regained his popularity. Under his rule the influence of France abroad was greatly increased. He gained the alliance of Cromwell by giving up Dunkirk; made French influence felt in southern Germany by the treaty of Westphalia in 1648; while the league of the Rhine, formed in 1659, and the marriage of Louis XIV in 1659 with the infanta Maria Theresa made France a claimant of the throne of Spain. Mazarin died at Vincennes, March 9, 1661. See Gustave Masson's *Mazarin.*

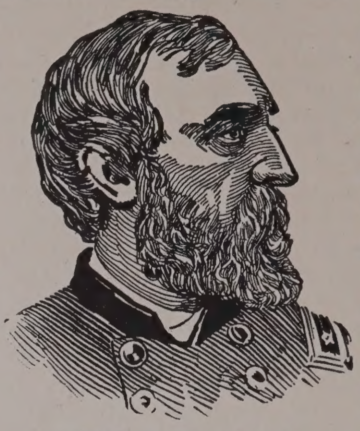
Mazeppa (*mȧ-zep'ȧ*), **Ivan Stefanovich,** hetman or chief of the Cossacks, was born in 1664 of a poor but noble family of Podolia, Poland. He became a page at the court of John Casimir, king of Poland. A jealous nobleman had him stripped naked and bound on his own horse, lying on his back and with his head to its tail, and let the animal loose, leaving Mazeppa to his fate. The horse carried him, senseless from exhaustion, to its native wilds of the Ukraine, according to the usual story. A more likely account is that his horse carried him through woods and thickets and brought him back, torn and bleeding, to his own home. Mazeppa now joined the Cossacks, became secretary to their hetman, Samoilovich, and in 1687 was chosen his successor. He won the confidence of Peter the Great, who loaded him with honors and made him prince of the Ukraine. But when Russia interfered with the freedom of the Cossacks (*q. v.*), Mazeppa determined to free them from the rule of the czar, and to this end conspired with Charles XII of Sweden. Peter discovered the treason, but long refused to believe it. Mazeppa's hopes perished in the disastrous battle of Pultowa in 1709, and with Charles he fled to Bender, the Russian fortress in Bessarabia, where he died the same year. His story is the subject of a famous poem by Byron and of two paintings by Vernet.

Mazzini (*mät-sē'nē*), **Giuseppe,** an Italian patriot, was born at Genoa on June 22, 1805. He entered its university when only 13, and before he was 19 was a practicing lawyer. In 1821 the sight of the refugees from the unsuccessful rising in Piedmont stirred him to devote himself to freeing his country. As a member of the Carbonari he was imprisoned in 1830. When set free the next year, his life-plan was settled. His first step was the formation of the Young Italy association. The first and last duties of its members were to work to make a free, independent and united nation. The masses were to be educated to understand their rights, and taught to secure them, if need be, by force. Shortly after Charles Albert became king of Sardinia. Mazzini urged him to put himself at the head of the struggle for national independence. His answer was a sentence of banishment. From

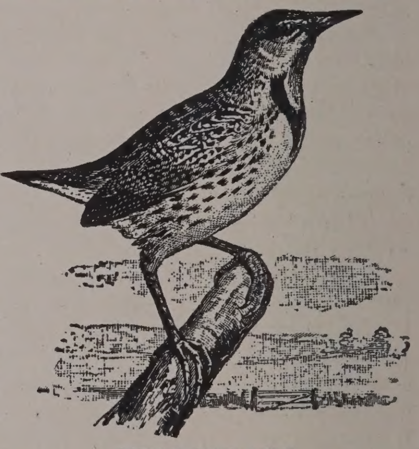
1832 he led "a life of voluntary imprisonment within the four walls of a little room" for over 20 years. During this time he was the most untiring political agitator in Europe, the man most dreaded by its absolute governments. He was always writing, and so eloquently and sincerely that he aroused his followers to an enthusiasm that would dare anything. His organization extended through Italy, and he went to England, where for seven years he struggled hard against poverty, yet managed to help his poorer, ignorant countrymen, the London hand-organ boys, by teaching and civilizing them in night-classes. On the outbreak of the Lombard revolt (1848) Mazzini threw himself into the struggle, though the king of Sardinia sought to win him. When the revolt failed, he made his way to Tuscany. Leghorn received him with wild enthusiasm in February, 1849, the day before the republic was proclaimed at Rome, and elected him her deputy to the republican assembly in the papal city. On March 29 Mazzini was chosen one of three triumvirs with the powers of dictators, but on April 25 the French arrived and in June the republic fell. Mazzini was sentenced to death three times, but in 1866 the sentence was formally rescinded, and he died peacefully at Pisa, Italy, March 10, 1872. Italian nationality is chiefly due to Mazzini, Garibaldi and Cavour. Mazzini prepared the soil, sowed the seed and fostered the growing plants; Garibaldi gathered the ripe fruit; but Cavour gained the final advantage of the harvest. See Marriott's *Makers of Modern Italy.*

Mead, Larkin Goldsmith, an American sculptor, was born at Chesterfield, N. H., Jan. 3, 1835. His early years were spent in Vermont. He studied art at Brooklyn, N. Y., and in Italy. The *Recording Angel,* his first work, was modeled in snow and afterward cut in marble. His large pieces have been executed for public buildings and monuments. Among them are the colossal statue of *Vermont,* on the dome of the statehouse, and of *Ethan Allen* in the portico of the same building in Vermont and one of the same hero, given by Vermont to the hall of representatives at Washington. The statue of Lincoln on the monument at Springfield and a group representing *Columbus before Queen Isabella,* for the state of California and the *Returned Soldier* are other specimens of his larger statues. He died Oct. 15, 1910.

Meade, George Gordon, an American general, born at Cadiz, Spain, Dec. 31, 1815. In the Mexican War he was on the staff of General Taylor, afterward on that of General Scott, and won honor at the battles of Palo Alto and Monterey. From 1856 to 1861 he was in charge of the surveys of the Great Lakes. In the Civil War he first was in command of the Pennsylvania brigade, and fought in the battles of Gaines' Mill and Frazier's Farm, where he was severely wounded, South Mountain, Antietam and Fredericksburg. He was in command of different corps of the army of the Potomac. Meade succeeded Hooker in the command of the army of the Potomac, and fought the battle of Gettysburg, July 1–3, 1863, receiving the thanks of Congress in 1866 for "his skill and heroic valor." He was made major-general in the regular army in 1864, and retained the command of the army of the Potomac, under General Grant, during the battles of the Wilderness, the siege of Petersburg etc. until the close of the war. He was in command of the division of the Atlantic, 1865–66; of the department of the east, 1866–67; and later of the military district which included Georgia, Alabama and Florida. His headquarters were at Philadelphia, where he died, Nov. 6, 1872, at his home the gift of his grateful fellow-citizens. See GETTYSBURG.


GEN. G. G. MEADE

Mead'owlark, or field-lark, one of our birds given the name of lark but not a true lark, a member of the blackbird family, close kin to the orioles and blackbirds. While very common, its protective coloring, that of the ground, accounts for the fact that it is not so often seen as the familiar blackbird with which it frequently associates. On the ground it spends all its time while feeding, and is a strong walker. It is about the size of the robin, upper part varying shades of brown and black, underneath yellow with a black crescent on the breast, white on tail conspicuous in flight. Its whistle, usually sounded from upmost branch, is piercing but most musical, "clear as the note of a fife, sweet as the tone of a flute." The western meadowlark is considered a worthy rival of the nightingale and wood-thrush. After a period of silence in the summer the bird may be heard again in the autumn. When perching it appears uneasy, twitching its tail about


MEADOWLARK

at every sound; on the ground it allows close approach. The nest (on the ground) is cleverly hidden, grasses curved over it, and about the middle of May it contains from four to six brown-speckled white eggs. The meadowlark is distributed throughout North America, and migrates in April and late October, some birds remaining all winter.

Mead′ville, Pa., capital of Crawford County, on Venango River in northwestern Pennsylvania, 125 miles north of Pittsburg. It is on the Erie Railroad and in railroad connection with Pittsburg and Lake Erie. It is the seat of a number of educational institutions, schools, colleges, conservatories of music and half a dozen libraries. Here are Allegheny College, a Methodist institution, with 19 instructors and 352 students, and a Unitarian theological seminary. Its industries include manufactures of engines, boilers, leather-belting, oil-well supplies, wood-mantels, sashes and blinds. The city has good water-works, natural gas for fuel and lighting and electric-light plants. Population, 17,000.

Measles (*mē′zles,*) a disease more contagious than scarlet fever, to which children are especially susceptible. It is probably caused by a micro-organism, though the germ has as yet not been isolated. It may be transmitted by the breath, throat and nose phlegm, and articles coming in contact with those afflicted. Ten to fourteen days after exposure the disease makes its appearance with a rise in temperature, headache, and a running of the eyes and nose, followed by a rash beginning usually on the face and neck, and spreading downward. The red spots appear in splotches and are thus unlike the smaller, more even eruptions of scarlet fever. The color, also, is different, measles being characterized by a dark red, while the eruptions of scarlet fever have a yellowish cast. After four days the rash and fever abate. Care should be taken that the patient is kept warm. Hot drinks may assist the rash to come out, a condition much to be desired. The intestines should be well relieved. Bronchitis, pneumonia, eye, ear, and throat troubles may occur as an aftermath. Keep the room darkened, and guard the patient against "colds." The diet should be light, as measles may affect the lining of the intestines. The patient should not be near any one who may contract the disease. A second attack is not unknown, though as a rule the patient is immune after the first attack. Black measles is a very serious form, but rarely occurs. German measles, with rose-colored eruptions and a mild fever, is probably a distinct disease. It is, as a rule, less distressing than measles, but the patient should be guarded against the same after effects.

Meas′urement consists essentially in the comparison of one quantity with another. Thus the measurement of a length, which is one of the simplest of all measurements, consists in determining how many times greater or less the given length is than some other given length which we agree to take as a unit. In like manner an interval of time is measured by comparing it with the interval which we employ as a unit, namely, the mean solar day. Evidently, therefore, it is possible to measure a quantity without understanding much about that quantity. No intelligent measurement, however, can be made unless one understands just what quantities are necessary to define the quantity about to be measured. The position of a point in space is intelligently measured only when we know that three definite and independent co-ordinates are required to locate the point and have determined the numerical values of these three co-ordinates. To measure the kinetic energy of a body in translation we must know how many units of mass there are in the body and with how many units of speed it is moving. Thus also we may accurately and definitely measure the acceleration of gravity at various points on the earth's surface, and yet not know the explanation of gravitation.

Practically all the quantities involved in physical science and engineering can be measured in terms of three quantities: a *length*, a *time* and a *mass*. The units of these three quantities are therefore called the *fundamental* units.

The standard of length, except in English and American commerce, is the *meter;* the standard of time the *mean solar day;* and the standard of mass the *kilogram.* (See EARTH, KILOGRAM and METER.) Units are founded upon standards, but they often differ in size from standards and may be chosen of a size which, for any particular purpose, is most convenient. Thus, in physics the centimeter or hundredth of a meter is most frequently employed; and in astronomy the second ($\frac{1}{86,400}$ of a day) is frequently a very convenient unit of time, though often the year (or 365 days roughly speaking) is more convenient.

Meat-Packing, an American industry which began with the salting of hogs for export from New England in the early years of American colonization, has now become one of the chief industries of the middle west. Its main centers are Chicago, Kansas City and Omaha, though it is carried on largely in other western cities. The industry includes the whole process of the disposal of carcasses of sheep, cattle and hogs killed for food. Thus meat-packing falls at once into two departments: the packing of fresh meat and that of cured meat. Both largely depend for success upon modern improvements in refrigeration. Fresh meat is simply frozen during some forty hours, and sent to market. But the bulk of the meat is canned or cured. The labor-saving devices in meat-packing have been brought to great perfection. The carcass is hoisted by the nose on an endless chain, and so passed through scalding-vats and automatically scraped. It is then disembowelled by machinery, beheaded, washed and trimmed, all these processes occupying but a few seconds. In meatpacking the bones are ground for manure or made into glue; and the hoofs, horns and hides are turned to account in many ways. The waste trimmings of the meat are made into sausages. It is obvious that such a process as meat-packing may be conducted carelessly and even in a manner dangerous to health. In 1891 a system of government inspection was instituted; but great scandals were revealed in 1904–5. An inquiry followed, and the result was the enactment by Congress of a law (1906) providing for rigid inspection of all animals before slaughtering, of all carcasses and meats and of slaughter-houses and meat-packing establishments, as well as of the whole process of canning, preserving and properly stamping and labeling all products.

Mecca (*mĕk'kȧ*), the holy city of the Moslems, is one of the oldest cities and the capital of Arabia. It is built in a narrow valley, surrounded by hills, which are crossed by two passes. The place is so secluded that the city is seen only when the traveler comes close upon it. It commands the principal caravan-routes, and early became a center of trade. The city is mainly modern, as the ancient buildings have been mostly destroyed by mountain torrents. The streets, unpaved and dirty, are broad, while the houses of stone, three and four stories high, climb the mountain. There is no drainage, and provisions of all kinds have to be brought into the city, owing to the barrenness of the soil. The population numbers about 60,000, who live upon the pilgrims who flock to the city and upon the manufacture of sacred relics. What gave Mecca its first reputation as a holy city is uncertain, though it is probably the possession of the Black Stone or fetish of the *Kaaba*, which attracted pilgrims ages before the time of Mohammed. This Black Stone is a small meteoric substance, and is built into the southeastern corner on the outside of the temple or *Kaaba*. There is another sacred stone, called the Southern Stone. The Moslems changed the temple with its heathen fetish, to a temple built by Abraham when he cast out Ishmael. The temple of Mecca or the Great Mosque is an open court surrounding the *Kaaba*, has 19 gates and 7 minarets, and holds 35,000 persons. The pilgrims walk around the *Kaaba* seven times, kiss the Black Stone and touch the Southern Stone, and pass around a small inclosure containing the supposed graves of Hagar and Ishmael. The *Kaaba* is covered with rich hangings, presented by the Sultan of Turkey, and has a door of silver and gilt, which is seldom opened to display the rich silver, marble and silk decorations of the interior. It is about 70 feet long, about 50 wide and nearly 40 in height. Every Mohammedan, whose means or health will permit, is obliged to make the pilgrimage to Mecca at least once. The Arabic word for a pilgrimage is *hadj*—and hence the Mohammedan who has made the journey to Mecca is called afterward a *hadji*. Some who cannot make the journey themselves send some one in their place, but the honor and rewards of the deed belong, not to the substitute, but to his employer. The sacred well of Mecca may once have been a mineral spring, but analysis now gives sewage as its principal element. The city was conquered by Mohammed in 627, five years after he had fled from it. See Burkhardt's *Travels in Arabia;* Irving's *Mahomet;* and Palgrave's *Narrative.*

Mechanics (*mḗ-kăn'ĭks*) is a word employed with two distinct meanings. Sometimes it is used to denote the science of matter and energy, more properly called *dynamics;* and sometimes it is employed to denote the application of dynamical principles to the theory of structures and to the theory of machines. Used in this latter sense, it is a branch of engineering and might more properly be called *applied mechanics*. At other times mechanics is used in a mixed sense to include both a discussion of dynamics and the application of dynamical principles to structures and machines. For *pure* mechanics see DYNAMICS. For applied mechanics see BRIDGE, LEVER, PULLEY, PUMP and STEAM-ENGINE. On pure mechanics — dynamics — consult Minchin's *Treatise on Statics*, Tait and Steele's *Dynamics of a Particle* and Thomson and Tait's *Treatise on Natural Philosophy*. Slate's *Mechanics* gives an excellent elementary résumé of the subject. Worthington's *Dynamics of Rotation* is still more elementary. For the applications of mechanics consult Church's *Mechanics of Engineering*, Johnson's *Materials of Construction* and Ewing's *Strength of Materials*. For the history of the subject read Mach's *Science of Mechanics* or Whewell's *History of the Inductive Sciences.*

Meck'lenburg Declaration of Independence, The, comprised a resolution or series of resolutions adopted in May, 1775, at a meeting of representatives of each militia-company in Mecklenburg County, N. C. It appears that the minutes which embodied the declaration were destroyed by fire in 1800. The declaration probably was restored from memory. Thus restored, it resembles the Declaration of Independence so closely that many of the phrases are word for word identical. It is possible that the Declaration of Independence in 1776 was in a measure modeled upon the Mecklenburg resolutions. It is urged, on the other hand, that many of the correspondences may be due to the confused recollection of those who restored the Mecklenburg Declaration to paper after the destruction of the original resolutions.

Mechlin (*mĕk'lĭn*) or **Malines,** a city of Belgium, 13 miles northeast of Brussels. It is a railroad-center, and has manufactories of woolen, linen, lace and beer. The Mechlin lace, so well-known, is made here, but the trade is much less than formerly, and the quality of the lace is below the former standard. Malines is a picturesque city, with fine public buildings, among which are the cathedral, several large churches, the bishop's palace, widows' asylum and the college. In the public square or Grande Place stands a statue of Margaret of Austria, and some paintings of Rubens and Vandyke are in the churches. Population 59,372.

Medes (*mēdz*), the people of Media, the ancient name for northwestern Persia. The inhabitants, called Medes, were an Aryan race. They were followers of Zoroaster, and their priests were the Magi. They were bold and warlike, skillful in the use of the bow and noted horsemen. They were partly subject to Assyria until about 700 B. C, when they had a chief, with his capital at Ecbatana, now Hamadan. With the aid of the conquered Persians and the king of Babylon, Cyaxares the third king (or, according to some authorities the first) captured Nineveh and overthrew the Assyrian empire about 607 B. C. In 550 B. C. the Persians under Cyrus revolted and overthrew Astyages, the Median king, and the two nations became one people, and are spoken of as the Medes and Persians. Mark Antony fought a disastrous campaign against it about 36 B. C., when it seems to have had a king of its own. Media was finally again united with Persia, and its later history is that of Persia. See *Five Great Monarchies of the Ancient Eastern World* by Rawlinson; *Races of The Old Testament* by Sayce; and *Media, Babylon* and *Persi* by Miss Ragozin in *Stories of the Nations.*

Med'ford, Mass., an old city of Middlesex County, on Mystic River and the Boston and Maine Railroad, five miles northwest of Boston. It is also connected with Boston by electric railway. Here is the seat of Tufts College (Universalist). Its manufactures embrace felt boots, pressed and face brick, print and dye works, carriage-factories and crackers. The city dates from 1630, but was organized as a city only in 1892. Population 45,000.

Medici (*mĕd'ē-chē*), a celebrated Italian family in Florence and Tuscany, who attained sovereign power in the 15th century and were great patrons of art and letters as well as noted statesmen.

Medici, Lorenzo dei, the Magnificent, was born of a wealthy Florentine family on Jan. 1, 1448. He was highly educated and early showed his great abilities. On the death of his father, Piero I, Lorenzo with his brother, Giuliano, was recognized as ruler. The great power of the Medici roused the envy of other Florentine families, and in 1478 they, in league with Pope Sixtus IV, plotted to overthrow them. Giuliano became the victim of the assassin, but Lorenzo defended himself with such courage, vigor and diplomacy as finally to put down the conspiracy, in spite of the papal bull and the aid of the king of Naples. Innocent VIII, successor of Sixtus IV, became the friend of the family, and opened to them many of the positions of power which they filled. Lorenzo was a patron af art and literature, and himself a distinguished poet. He established a printing-press at Florence and the University of Pisa, and enlarged the library founded by his grandfather, Cosimo. He governed the state well, but made everything yield to the advancement of his family, and so left Florence weakened and ready to be the prey of her enemies. He died on April 8, 1492. See *Life* by Roscoe; *Poetry and Poets of Europe* by Longfellow; and *Lives of Italian Poets* by Stebbing.

Med'icine Hat, a town in the province of Alberta. Population 5,500. It is situated on the south bank of the Saskatchewan. It is noted for its natural-gas wells, which supply material for heating and lighting. An excellent country is tributary to it.

Med'icine-Man is the name commonly given to the individual in an Indian tribe who combines the offices of doctor and priest. Investigations into the character of the medicine-men among the Ojibwas, Cherokees and Apaches have shown that the powers and privileges of medicine-men vary greatly in different tribes. In some of the South American tribes the medicine-man is chief as well as priest and doctor. In Guija, Brazil and occasionally among the North American tribes organizations of cults of medicine-men exist for the purpose of communicating, transmitting and guarding their secrets. The medicine-man guards and interprets the tribal "medicine" and also the personal "medicine," which is supposed to influence the life of the individual intimately. He attempts to cure sickness and turn away disaster; and presides over the initiatory ceremonies at the age of puberty and over the numerous religious and symbolic dances and celebrations held on important or periodic occasions by the tribe. Medicine-men of one type or another appear to occur in almost all so-called primitive societies.

Medi'na, Arabic for The City, is the holiest city of the Mohammedans, next to Mecca, because it was the home of Mohammed after his flight from Mecca. It is situated in western Arabia, about 270 miles north of Mecca. About half as large as Mecca, it is inclosed by a wall from 35 to 40 feet in height, with 30 towers, and a castle with a Turkish garrison, making it one of the strongest fortified places in that part of Arabia. The present population (about 46,000), live by agriculture and the alms or spoils of the pilgrims who flock thither, as to Mecca, but at no particular time. The prophet's mosque is thought to be built on the spot where Mohammed died and to surround his tomb. The sepulcher is an irregular chamber, 50 to 55 feet in height, with a large, gilt crescent above. Within, costly curtains, embroidered with gilt letters, cover a square building of black marble, where the prophet's body is believed to lie, undecayed, with the face toward Mecca. No European has ever been allowed to see the coffin, which is cased with silver and covered with a marble slab; but there seems no reason to doubt that it really is the burial-place of Mohammed. The city once was famed for its scholars and theologians, and in the 7th century was the capital of Islam. On Sept. 1, 1908, the Medina and Damascus railway, 1,000 miles long, was opened to traffic.

Medieval Period. See Geology.

Med'iterra'nean, The, is the laregst inclosed sea. It is connected with the open ocean (the Atlantic) only by the narrow Strait of Gibraltar, nine miles wide. The name is derived from its being in the midst of three continents: Europe, Asia and Africa. It is 2,200 miles long, varies from 500 to 100 miles in width, and has an area of 900,000 square miles. It is connected with the Black Sea by the Dardanelles, Sea of Marmora and the Bosporus. The coasts of Europe and Asia Minor have many bays and gulfs, while the coast of Africa is even, with few indentations. The Tyrrhenian Ionian, Iberian and Ægean Seas and the Levant are different parts of the Mediterranean. Sardinia, Corsica, Sicily, Malta, Cyprus and Crete are among the larger islands. The region is subject to earthquakes, and Vesuvius, Stromboli and Ætna are its most famous volcanoes. The bottom is divided into two parts by a ridge which crosses it from Sicily to Africa, the water being deeper in the eastern basin. The evaporation is greater than the amount of water poured into the Mediterranean by its rivers, and if it were not for the water of the Atlantic which flows in at Gibraltar, above the outflow of the heavier water of the Mediterranean, the sea would become salter and shrink into two salt-lakes like the Dead Sea. Suez Canal connects the Mediterranean with the Red Sea. The chief rivers that flow into it are the Rhône, Po and Nile. The countries bordering the Mediterranean (Phœnicia, Greece, Egypt and Italy) have been cradles of civilization, and the sea is well-known in history, poetry and ancient story, and to-day is one of the most important water-routes of the world.

Medulla Oblongata (*mē̇-dŭl'lȧ ŏb-lŏn-gā'tȧ*), the part of the hind-brain merging into the spinal cord, the hind-brain being made of the cerebellum and the medulla oblongata. It is a very important part of the brain. The cranial nerves, with the exception of the optic and olfactory nerves, are connected with it, and in it are also located clusters of nerve-cells — or especial centers,— that preside over special actions. Here, for example, are located the respiratory center, controlling the respiratory movements; the cardiac center, for regulating the action of the heart; the vasomotor center, for regulating the calibre of the blood vessels; the sneezing center; and others. These centers may be excited to greater activity or held in check (inhibited) by various forms of stimulation from the external world or from within the body. See Brain.

Medusa (*mē̇-dū'sȧ*), in Greek mythology, one of three sisters called the Gorgons. They had but one eye among them, a fortunate circumstance, as whoever they looked on was changed to stone. Medusa is represented in art as a winged virgin, with hissing snakes for hair, brazen claws and a single tusk for a tooth. They kept the garden of the Hesperides, where Medusa was slain by Perseus.

Medusæ (*mē-dū'sē*), a group of free-swimming jellyfish. They have a dome-shaped or umbrella-shaped swimming-disc of jelly-like consistency. From the margin of the disc hang many tentacles, which, from their fancied resemblance to the snaky locks of Medusa the gorgon, gave these animals their name. See Cœlenterata, Hydrozoa and Jellyfish.

Meerschaum (*mēr'sham*), is a mineral, found in several parts of the world, consisting of hydrous magnesium silicate. It is a white, clay-like substance, which, when dry, will float on water: hence its name, which means sea-foam. When first dug from the earth it is soft, like soap, makes a lather in water and takes out grease, and is often used instead of soap by the Turks. In Europe it is found in Moravia, Spain and the Crimea, and in Turkey in Asia there are large beds of it just below the soil. It is also found in South Carolina. It is used almost entirely for the manufacture of tobacco-pipes, the Austrians being the most largely engaged in the trade. The pipes made at Vienna often are worth $500, from the great beauty of their design. The waste material left after cutting the pipes is ground into powder and mixed into a paste, from which the cheaper pipes are made.

Megaphone (*mĕg'ȧ-fōn*), a large funnel-shaped tube used for reflecting sound. A tube of this kind may be used either to receive sound, when it becomes an ear-trumpet, or it may be used to transmit sound, in which case it becomes a speaking trumpet. The principle is that which is employed in the headlight of a locomotive, where the light-waves are reflected and sent out in a more or less parallel beam along the track. The only difference is that in the megaphone sound-waves, and not light-waves, are reflected. The two principal uses of the megaphone at present are, *first*, to transmit the sound of a phonograph in the direction desired and, *second*, to transmit the human voice to a long distance or to a large audience, as at horse-races and ball-games.

Megasporangium (*mĕg'ȧ-spō̇-răn'jĭ-ŭm*) (in plants), the sporangium which produces megaspores. In pteridophytes (fern-plants) they are produced by the water-ferns, selaginella and isoetes; while in all seed-plants (spermatophytes) the so-called ovules are megasporangia, sometimes called macrosporangium. See HETEROSPORY.

Megaspore (*mĕg'ȧ-spōr*) (in plants). In cases of heterospory (which see) the large asexual spores are called megaspores, sometimes macrospores. In germination a megaspore produces a female gametophyte, that is, one which bears the eggs. Megaspores are found in a few pteridophytes and in all spermatophytes. In the latter group but a single megaspore is produced by the megasporangium (ovule), and is not shed, often being called the embryo-sac. It is this single, retained megaspore which results in the formation of a seed by the ovule. See HETEROSPORY.

Megasporophyll (*mĕg'ȧ-spōr'ō-fĭl*) (in plants) the sporophyll which bears megasporangia, sometimes called macrosporophyll. Megasporophylls are chiefly developed in seed-plants and in the angiosperms (true flowering plants); they have been called carpels, the innermost organs of flowers. See HETEROSPORY.

Mehemet. See MOHAMMED ALI.

Meissonier (*mā'sō'nyā"*), **Jean Louis Ernest,** a French artist, was born at Lyons, Feb. 21, 1815, in great poverty. As a youth he painted several early pieces which he sold at one dollar the square yard. When 19, he succeeded in getting to Paris, where he was soon admitted to the studio of Leon Cogniet, by whom his ability was soon recognized. His distinctive excellence in small paintings finished with exquisite precision was soon developed, and many of his most celebrated pieces are but a few inches in height or breadth. His first public exhibition occurred in 1834. From that time he was popular and prosperous. In 1861 he became a member of the Institute. No one has excelled, few have ever approached, him in his chosen field. Nearly all of his pieces have to do with the military, and his masterpiece, *Friedland — 1807*, one of the largest, by the way, he ever painted, was brought to New York and now is in its Metropolitan Museum. He died at Paris, Jan. 31, 1891. See *Life* by Mollet.

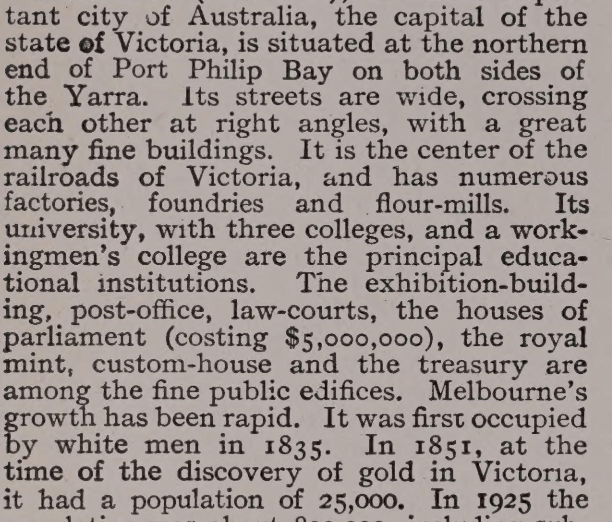
Meistersinger von Nürnberg Die (*dē mīs'tẽr-sĭng'ẽr fōn nürn'bĕrg*). A music drama, words and music by Richard Wagner (1813–33). The first sketches for this work were made as early as the summer holidays of 1845 but it was 22 years before it was completed. In 1868 it had its first performance under Von Bülow (1830–94). It is the only comic opera by Wagner, and by some good musicians is considered his most satisfactory work. It is characterized by nobility and dignity, highly finished melody and the spirit of true comedy. The prelude often finds a place in the concert-room, and few songs for tenors awaken popular interest as does the famous prize-song.

Me'kong' River, Cambodia, flows southeastward from Tibet through the Chinese Empire and Indo-China to the China Sea. Cochin-China is simply the delta of this great river, which has a length of more than 2,500 miles. Unfortunately, navigation is impeded, except near the mouth, by many falls and rapids. As one passes down the navigable portion villages of from ten to one hundred huts are to be seen upon the banks, with their rows of poles for hanging nets and large platforms upon which the fish are dried. Smoked and salted fish are exported in vast quantities from the Mekong to Asiatic ports. For fuller description consult Vincent's *Land of the White Elephant.*

Melanchthon (*mē-lănk'thŭn*), **Philip,** a German reformer and friend of Luther, was born on Feb. 16, 1497, at Bretten in Baden, Germany. He studied at Heidelberg and Tübingen. He lectured on the philosophy of Aristotle in 1514, and soon after published a Greek grammar. His appointment to a Greek professorship at Wittenberg in 1518 brought him into contact with Luther. He threw himself at once into the work of the Reformation, bringing to it an extent of learning nearly equal to that of Erasmus and a gift of clear thinking and expression unequaled among his fellow workers. The first great Protestant work on theology was written by him and published in 1521, going through more than 50 editions in his lifetime. In 1530 he published his defense of what is known as the Augsburg confession of faith, the foundation of the Protestant religion in Germany, which confession had been prepared by him and submitted to the assembly of German princes at Augsburg. Melanchthon's works are very numerous, including commentaries on parts of the Bible and classical works, books of doctrine and moral philosophy. He ranks among the highest names in the history of learning and education. He died at Wittenberg, April 19, 1560. See *Life* by Cox and *History of the Reformation* by D'Aubigne.

Mel'ba, Nellie, a great prima donna, with wonderful clearness and purity of note, was born in Melbourne, Australia, in 1865. She was educated at the Presbyterian Ladies' College at Melbourne; and afterwards studied singing in Paris under Marchesi. Her début was made in 1887 in Brussels as Gilda in *Rigoletto;* her London début in *Lucia.* Melba is a stage-name; her family name being Mitchell. She was married in 1882 to Charles Armstrong. She sang at the Opera in Paris from 1889 to 1892; and has since toured Europe, America and Australia. She perhaps is at her best as Lucia, Juliette, Ophelia or Nedda. Her voice is the purest soprano.

Melbourne (*mel'bûrn*), the most important city of Australia, the capital of the state of Victoria, is situated at the northern end of Port Philip Bay on both sides of the Yarra. Its streets are wide, crossing each other at right angles, with a great many fine buildings. It is the center of the railroads of Victoria, and has numerous factories, foundries and flour-mills. Its university, with three colleges, and a workingmen's college are the principal educational institutions. The exhibition-building, post-office, law-courts, the houses of parliament (costing $5,000,000), the royal mint, custom-house and the treasury are among the fine public edifices. Melbourne's growth has been rapid. It was first occupied by white men in 1835. In 1851, at the time of the discovery of gold in Victoria, it had a population of 25,000. In 1925 the population was about 800,000, including suburbs. In 1888 an international exhibition was held on the hundredth anniversary of the settlement of Australia, which cost the colony $1,000,000. Melbourne was in 1901 visited by the duke of Cornwall and York (heir-apparent to the English crown) and his consort on the opening of the first parliament of federated Australia. See Lord Melbourne's *Victoria and its Metropolis.*


MELBOURNE AND PORT PHILLIP
ENGLISH MILES
0
5
10
MELBOURNE
Foots Cray
Brooklyn
Kew
Sandridge
St. Kilda
Ripley
Wyndham
Werribee R.
Little R.
Williamstown
Hobsons B.
Brighton
Cheltenham
Maude
Rothwell
Pt. Cooke
Pic Nic Pt.
Pt Barring
Mordialloc
Lara
Bateford
Berwick
Pakenham
PORT PHILLIP BAY
Pt. Wilson
Corio B.
Portarlington
Cranbourne
Evansf.
Barwon
Geelong
Drysdale
Frankston
Koo Wee Rup Swamp
S. Geelong
Kensington
St. Leonards
Davy Pt.
German T.
Conewarre L.
Swan Bay
Mud I.
Mornington
Osborne
Queenscliff
Jan Juc
Pt. Lonsdale
Pt. Nepean
Hastings
French Island
Tyabb
Puebla
Sorrento
Rye
Dromana
Sandy
Balnarring
Pt. Addis
Flinders
Western Port
Corinella
Roadknight
Fingal
Kenthorp
Rhyll
Bass Br.
Newhaven
C. Schanck
West Hd.
Pt. Grant
Phillip I.
Pyramid
C. Woolamai
BASS STRAIT
C. Paterson

Melo'deon, a musical instrument somewhat like a piano in appearance, but depending upon a bellows and reeds for producing the music. It was first manufactured in the United States, over 20,000 being made in 1859, but is superseded by the cabinet organ, which is somewhat like the melodeon, with many and great improvements.

Mel'on, the general name most commonly associated with muskmelons and watermelons, sometimes extended to include gourd-fruits in general. See MUSKMELON and WATERMELON.

Mel'rose Ab'bey, a celebrated abbey in Roxburghshire, Scotland, situated near the town of Melrose, on the Tweed, 38 miles from Edinburgh. It was built in 1136 by David I, twice burned by the English, rebuilt in greater splendor and again destroyed by English invasions. It is one of the finest examples of Gothic architecture, even in ruins, and in its prime was the most beautiful building in Scotland. The abbey has been celebrated by the writings of Sir Walter Scott, whose home, Abbotsford, is in the vicinity and is visited by many tourists. See *The Abbot* and *Lay of the Last Minstrel* by Scott.

Melrose, Mass., a city of Middlesex County eight miles north of Boston, on the Boston and Maine Railroad. It is a growing town, and possesses schools, churches, public parks, halls, library, banks, hotels and club-houses. Its industries include the manufacture of rubber-boots and shoes, furniture, silver-polish and sewing-machine needles. Spot Pond, a natural reservoir, and the state reservation at Middlesex Fells attract visitors. Population 22,000.

Mel'ville, George W., an American engineer, was born at New York, Jan. 10, 1841. He was educated at Brooklyn Polytechnic School, and entered the United States navy on July 29, 1861, as third assistant-engineer. He became engineer-in-chief in 1887 and rear-admiral in 1899. He personally, by various inventions, contributed not a little to the expansion of the American navy. During his term 120 ships with a combined force of 700,000 horse-power were constructed under his supervision. In 1879 he joined the Arctic expedition under command of Lieutenant De Long, and commanded the boat's crew which escaped from the delta of the Lena. He afterwards recovered the records of the expedition and the remains of the unfortunate party which perished on the shores of Siberia. He received a gold medal by special act of Congress for his bravery and success. In 1885 he published *In the Lena Delta,* relating the experiences of the survivors of the *Jeannette.*

Mem'non, one of the heroes of the Trojan War, was, in Greek mythology, the son of Aurora. He led a band of Ethiopians to the aid of Troy, slew Antilochus in single combat and was himself slain by Achilles. Two famous statues were discovered by the Greeks at Thebes, and one of them was supposed to be that of Memnon, though more probably that of an Egyptian king. It is one of the "seven wonders of the world," is about 60 feet high, and about sunrise gave out a sound like the snapping of a chord. The Greeks called it "the voice of Memnon hailing his mother, Aurora" (the dawn). It was visited by many travelers until the time of Emperor Severus (A. D. 146–211), when it became silent, and it is inscribed with the names of many celebrated visitors. The origin of the sound is a matter of conjecture, though it has had several explanations. See *Edinburgh Review*, July, 1886.

Mem′orizing. Early systems of education, for example that of the Chinese, appeal to the memory in a comparatively mechanical way, and with them the importance of memorizing is plain and unquestioned. Educational advance in modern times (see EDUCATION, MODERN) has, on the other hand, thrown the importance of this process somewhat into the background. The difference, however, is not so great as might at first appear. Learning by rote is not so much a schoolroom method as formerly, but committing to memory remains to-day as of yore the main business of education. The change has been one of method rather than of ultimate aim. For to remember, in the most general sense of the term, means to store up experience in such a way that the result affects the activities of the individual. All learning, therefore, in point of fact is memorizing. Modern education, when it lays emphasis especially upon cultivating ability to observe, reason, judge and act, is simply calling attention to the various ways in which memory preserves and employs its material. To observe well we must have noticed and remembered the objects or qualities to be observed. The botanist notices the forms of plants because he has fixed this sort of thing in memory. The tailor notices the nicer peculiarities of clothing, which the botanist may well fail to see. So, too, in reasoning, a memory for the laws, principles or concepts on which reasoning is based is indispensable.

The investigations of Galton and others, with the results of researches into the functions of the cortex of the brain, have brought to light the fact that people may differ in respect not to the degree only but to the kind of memory and imagination. Some have a good imagination for visual images but little for sounds, and the reverse also may be true. Some remember words especially well, and there is a distinct memory for abstract relationship, which doubtless is the basis of ability to reason in the fields concerned. In teaching, therefore, it frequently is important to take account of the pupil's special powers of memory. A child, for example, may fail to respond to oral instruction because he is "eye-minded" rather than "ear-minded." If the work can be put in such a form as to appeal to the eye, it may be taken in readily.

The success with which everything is committed to memory depends upon the strength of the impression made by it upon the mind and the number and strength of the associations established between it and other things. No matter how firmly a thing may be impressed on the mind, its recall depends upon whether the experiences of life suggest it. This liability to be suggested depends upon the number of associations with experiences that are likely to come up. Hence, methods of memorizing are either mechanical, aiming to strengthen the impression or its associations, or associative, aiming to increase the number and variety of associations likely to prove valuable. Under mechanical methods may be included intensification of the stimulus, concentration of the attention and repetition. All of these are of great importance, attentiveness at all stages in learning, and repetition especially for drill. Learning by rote depends upon these mechanical forces. Its defect lies in the fact that the material thus memorized may not be so associated with current experience as to be recalled when wanted. Associative methods aim to remedy this lack. The objects that are associated may be logically connected, or the associations may be arbitrary or forceful. The latter sort give rise to mnemonic devices, as, for example, the familiar trick of tying a string around one's finger to insure the recall of a certain errand or the use of rhymes to remember the number of days in the various months etc. Most mnemonic systems, like that of Loisette, are based on such devices. These methods have been used from time immemorial, but have never proved of more than occasional value. On the other hand, logical associations are the backbone of effective memory. All good teaching aims at treating its subject in a rational or logical way; that is, in making it habitual to associate such data as bear real and important relationships to each other. Thus we are made most likely to call up what we want when we want it. See ASSOCIATION OF IDEAS and EDUCATION, MODERN. Consult *Principles of Psychology* by James and *Memory* by Kay.

Mem′phis (*mem′fis*), the well-known city of Egypt, was the ancient capital. It is on the Nile, ten miles south of Cairo. The city was founded by the first Egyptian king, who changed the bed of the Nile and built an embankment to protect the city, the remains of which are still to be found. It was a large city, about seventeen miles in circumference according to some writers, having communication both with the Mediterranean and the Red Sea. It had a large trade, and was the seat of learning and religion. Memphis was the capital for nearly a thousand years. It was conquered by Sennacherib and by the Persians; Alexander the Great worshiped at the shrine of the sacred bull, and the first Ptolemies were crowned in its temples. Ptolemy VIII destroyed the city, and it fell with the rest of Egypt under the Roman power. Its temples were magnificent, including those of Isis, the Apis, Ptah (where was kept the sacred bull), and Serapis, where there was a Nilometer to record the floods of the Nile. Most remarkable of all the ruins are the pyramids, including the great pyramid of Cheops and the statue of the Sphinx. Memphis remained the chief city until Alexandria was built, when it fell into ruins, and for a long time even its site was unknown. The village of Mitrahenny now stands on the site of Memphis. The ruins of temples, palaces and statues cover hundreds of acres.

Memphis (*mĕm′fĭs*), the largest city in Tennessee and the seat of Shelby County, is situated on the Mississippi River, at the head of deep water navigation, 305 miles below St. Louis and 396 miles above New Orleans. The location of Memphis has resulted in an immense water traffic to all ports on the Mississippi and Ohio Rivers. The city is the home port of several steamer lines. Ten important railways converge at Memphis, and airways operate from the city in four directions. Several important automobile highways lead to this busy city. Memphis is built on the plateau of Chickasaw Bluffs which ranges from thirty-two feet above water level at the river front to eighty feet farther back. A wide levee restrains the river, and a great cantilever bridge, 1,895 feet long, crosses the Mississippi River at this point.

The city has broad, spacious, and well-paved streets. The park system comprises 1,426 acres of natural woodland and playgrounds. The largest park extends over an area of 430 acres. The principal parks are Riverside and Overton. The Memphis Zoological Garden is situated in Overton Park. The parkway system which stretches on three sides of the city is the most extensive in the South. A riverside boulevard has been added recently, skirting the bluffs and overlooking the river for a distance of almost two miles. There are many beautiful buildings, including the Brooks Memorial Art Gallery, the Cotton Exchange, the Court House, the Masonic Temple, the Grand Opera House and the Cossit Library. There are a number of attractive club houses and some fine hotels, as well as several imposing churches. Among the higher institutions of learning, which are situated in Memphis, are the Goodwyn Institute; the Hannibal Medical College; the LeMoyne Normal Institute for Negroes; the Christian Brothers College; Howe Institute; the Colleges of Medicine, Dentistry, Pharmacy and Nursing of the University of Tennessee, and several private and vocational schools. The United States Marine Hospital is one of the several large hospitals in the city. The important philanthropic institutions include St. Peter's Orphanage, the Church Home, the Anna Brinkley Home for young girls, and thirty others.

Memphis is ranked as one of the largest inland cotton markets in the world, due largely to its favorable location and transportation facilities. The city is also the greatest hardwood lumber market in the world, and has extensive manufacturing industries. More than 1,000,000 bales of cotton and 300,000,000 feet of lumber are produced annually. In 1931, there were 33,334 employes in 519 manufacturing establishments, earning a wage of $36,000,000 and producing goods valued at $189,000,000. The chief industries are woodworking, cotton-seed oil and its byproducts, mixed feeds, assembled automobiles, automobile bodies and wheels, fabricated iron and steel, lumber, hardwood flooring, furniture, cosmetics and pharmaceuticals. There are many other manufactures, however, including cotton gins and boilers, bricks, tile and pottery, foundry products, and stoves and ranges. Memphis has enjoyed a steady industrial growth.

The site of this important city was an Indian ford and meeting place long before any white man visited American shores. In 1541, De Soto first saw the "Father of Waters" from the Chickasaw Bluffs and used this ford to cross the river. Marquette, Joliet, La Salle, de Tonti and other explorers later camped at this site. During the Indian wars in the South, Bienville, a governor of Louisiana during the French regime, built Fort Assumption upon this site in 1698. The Spanish however, captured Fort Assumption, and in 1794 erected their own fort in its place. This Spanish defense was captured by United States and Fort Adams was built on the same site. The acreage occupied by the city of Memphis at the present time was owned by Judge John Overton, General James Winchester and General Andrew Jackson. These men laid out a town in 1819 and called it Memphis. Seven years later it was incorporated with a population of 500, and received a city charter in 1849. Terrible epidemics of yellow fever ravaged the population in 1855, 1867, 1873, 1878 and 1879, being especially severe in the last two years. During the Civil War a Confederate fleet of eight vessels in command of Commodore Montgomery was destroyed at Memphis, and on June 6, 1862, a Federal fleet of nine vessels in command of Commodore Davis. In that year the Union Navy captured the city and held it until the war closed. Memphis suffered considerable damage by gunfire in these engagements. The realization of the paralyzing effect of recurring fever epidemics on trade and industry forced the city to action, and a pure artesian water supply was discovered and the sewerage system perfected after the 1879 visitation. The city charter, which had been annulled as the decimated city could not liquidate its indebtedness, was restored in 1893. Commission government was adopted in 1909. The population has steadily increased from 102,320 in 1900, to 131,105 in 1910, 161,351 in 1920 and 253,143 in 1930.

Memphremagog (*mĕm′frē̇-mā′gŏg*), **Lake,** on the northern border of Vermont, adjoining Quebec, is about thirty-five miles long and from two to five miles wide. It has many islands and an abundant supply of fish. The Magog River at the northern end provides an outlet.

Menai Strait (*mĕn′ĭ*), a channel separating the island of Anglesea from Wales. It is fourteen miles long and from 200 yards to two miles wide. Navigation is difficult, but the passage is much used, as it saves time. The channel is crossed by a suspension-bridge built in 1825 and by the famous Britannia bridge built in 1850. This is a tubular iron bridge, used for railroads.

Menasha (*mē-năsh′ȧ*), a city of Winnebago County, Wisconsin, is situated on the Fox River at Lake Winnebago. The city has paper, lumber, pulp and woolen mills operating within its confines. In 1930 the population was 9,062.

Mendel, Gregor, an Austrian peasant and later an abbot of Brunn, was born in 1822. He is internationally known as the author of Mendel's Law, which states certain definite principles of heredity. He experimented with garden peas, using cultivated varieties of *Pisum sativum.* He started his experiments with seven pairs, crossing them, and using only forms which are known to be constant from generation to generation. He discovered three possible types of union: (1) the sex cells of type A may unite with type A, and produce pure forms; (2) the sex cells of type B may unite with type B, and produce another series of pure forms; (3) the sex cells of type A may unite with those of type B and produce a series of hybrid forms. According to the doctrine of chance, the hybrids will tend to be twice as numerous as either of the pure forms, a fact which may be expressed algebraically as $A+B\times A+B=A^2+2AB+B^2$. The proof of this existence of definite numerical relation among the hybrids is one of Mendel's important contributions to science. He first applied the terms dominant and recessive to the parent-characters as they appeared or did not appear in the hybrid offspring. Mendel concluded that the facts of his results are only explicable on the hypothesis that the hybrid offspring contained each an equal number of the two types of sex cells contained respectively in the parents. The principles of Mendel's law seem to afford a rational explanation of certain formerly obscure phenomena of hybridization. They are now the foundation of an ever-growing knowledge of heredity and have exerted a profound influence on modern biological science. Mendel died in 1880.

See Evolution: Heredity.

Mendelssohn (*mĕn′dĕl-sōn*) **Bartholdy, Jakob Ludwig Felix,** a famous composer, was born at Hamburg, Germany, on February 3, 1809. The name was already famous through his grandfather, Moses Mendelssohn the philosopher, but his father determined to rear his children as Christians, and added Bartholdy to his young son's name to distinguish it from the Jewish branch of the family. At the age of eight Mendelssohn began his study of music, and two years later he appeared in a concert in Berlin. In 1820 he began his work of musical composition, which ended only with his death. His operas of *Camancho's Wedding,* and *Midsummer Night's Dream,* were published in 1825 and 1826. In 1827 the former was produced in Berlin. He formed a choir for the study of Bach's passion-music, ending a famous performance in 1829. He visited England in April, 1829, making his first appearance in a concert of the Philharmonic Society at London. He visited Munich, Vienna, Rome and Paris before returning to Berlin. The renowned musician spent two years at Düsseldorf where he supervised musical and dramatical entertainments. Leipsic became his home in 1835, where he took charge of the Gewandhaus concerts. He visited England in 1837 and 1840. In 1841, at the command of the king, Mendelssohn went to Berlin. In England, Mendelssohn conducted his *St. Paul,* which was very popular, and in Berlin he composed *Antigone* and *Œdipus.* His oratorio of *Elijah,* on which he spent nine years, was composed for the Birmingham festival and produced there in 1846. He was eminent not only as a composer, the list of his works being very large, but as a pianist and organist. His music is gay and cheerful. He was also talented in drawing and improvisation. His excessive labors, however, gave rise to brain disturbance from which he died on November 4, 1847, at his home.

Mendez-Pinto (*men′dēz pēn′to*), **Fernao,** a Portuguese adventurer, was born about 1510. He first saw Japan while in the service of a Chinese pirate, and at Ningpo his stories of its wealth induced the Portuguese to visit the new country. He made three other visits to Japan, once in company with St. Francis Xavier, and once as ambassador from the Portuguese Viceroy of India. His fortune, which was enormous, he devoted almost entirely to founding a Roman Catholic seminary in Japan. He wrote the story of his life, which is now accepted as true, although for many years it was thought to be greatly exaggerated. He died on July 8, 1583.

See Japan.

Mendicant Orders. See Dominicans; Franciscans.

Menelek II, king of Abyssinia, was the son of a king of Shoa, and claimed to be descended from Solomon and the Queen of

Sheba. He claimed the throne by divine right, but was held a prisoner for ten years by Theodore III. He married the daughter of Theodore, and after a struggle against John, his successor, was acknowledged the next heir. On the death of John in battle in 1889, Menelek was chosen and consecrated emperor. He was clement to his only rival, the natural son of John, whom he made governor of a province. Menelek became involved in a dispute with Italy, which claimed territory along the Red Sea and a protectorate over Abyssinia (*q. v.*) The war which followed ended in a great victory for Menelek at Adowa in 1896. Italy was compelled to acknowledge Abyssinia's complete independence. Menelek came to an agreement as to the Somaliland frontier with Great Britain in 1898. He agreed to keep the caravan-routes open and not to countenance the followers of the Mahdi in the Sudan. He died in 1914.

Menendez de Avilés (*mā-nān'dāth dā ä'vē'lās'*), **Pedro,** a Spanish admiral, was born at Avilés, Asturias, in 1519. After many years of service against French corsairs and as commander of the Indian fleet, he was appointed commander of Florida, with orders to found a Spanish colony. His fleet of 34 ships, with 2,646 colonists, sailed from Cadiz on June 29, 1565. Meanwhile a Huguenot colony had settled in Florida. Menendez surprised the French fort and massacred the people — "not as Frenchmen, but as Lutherans." This was "the last crusade." He established colonies at St. Augustine, which he named Cape Carnaveral and Port Royal harbor, South Carolina, and explored the coast as far as Chesapeake Bay. While absent in Spain, a French adventurer captured San Mateo, one of his forts, and avenged the massacre of the French Huguenots — "not as Spaniards, but as traitors, thieves and murderers." On his return in 1572 he avenged the massacre and explored the whole coast, until recalled by the king to command a fleet getting ready to sail against the Low Countries. He died at Santander, Spain, Sept. 17, 1574.

Menha'den, the name of a fish, a species of herring or shad, very abundant off the eastern coast of the United States. It is called whitefish, bonyfish, hardhead and mossbunker. Menhaden are taken in nets, sometimes as many as will fill 100 barrels in a night, and sold for food, bait and manure. They are too oily to be much use for food, but make excellent manure. The oil is used in dressing leather. The business of catching these fish and manufacturing the oil and the fertilizers from them is very large, and is carried on from Maine to New Jersey.

Mennonites (*men'non-ĭts*), a body of Christian believers, named after Menno Simons, a religious reformer of the 16th century. As a sect they seem first to have drawn together in Switzerland about 1525, although they claim to be descendants of the Waldensians. Menno himself was born in Friesland about 1492. In 1536 he withdrew from the Roman church, identified himself with the Anabaptists, and became a bishop of their sect at Groeningen. He died in 1559. William of Orange befriended the Mennonites and gave them certain liberties in Holland, which the Dutch states afterwards withdrew. In 1786 Catharine II of Russia invited the Mennonites, with other German emigrants, to settle her dominions. They for a time were liberally aided in money, and granted perpetual exemption from military service. The privileges extended to them drew a large number to Russia and their towns increased in numbers and wealth. But in 1871 a policy of repression was introduced, and exemption from military duty was to be withdrawn after the expiration of ten years. The leaders began immediately to seek new homes for their people; and large colonies emigrated to the United States, whither smaller bodies had preceded them. The earlier comers for the most part settled in Pennsylvania; the later in the Dakotas. They already are divided into various minor sects, of which perhaps the *Amish* are most frequently mentioned on account of their peculiar abhorrence of buttons, using only hooks and eyes upon their heavier garments. Statistics show that in 1907 only 61.690 Mennonites were in the United States, although this number was divided into no less than 12 sects. Mennonites are sometimes classed with the Baptists on account of their practice of immersion; but more frequently with the Friends (Quakers) on account of their abhorrence of war.

Menominee (*mē-nŏm'ĭ-nē*), **Mich.,** county-seat of the county of the same name, situated at the mouth of Menominee River on Green Bay, at the extreme southern point of the northern peninsula of Michigan. It is 50 miles north of Green Bay City, Wis., and on the Chicago, Milwaukee and St. Paul and Chicago and Northwestern railroads. It also transacts considerable business over the Wisconsin, Michigan and Ann Arbor Railroad, of which it is the terminus. It is conveniently situated as a lumber-shipping port, and has a number of sawmills, and manufactures beetsugar, machinery and shoes. Besides these industries the city is an important cedar-market Marble is quarried in the vicinity, and iron mined. Population 10,507.

Men'tal Dis'cipline. In general this expression has referred to the common idea that the mind possesses certain general powers that can be improved by use and training. Mental discipline is supposed to sharpen the senses, strengthen the memory and develop the powers of judgment and will. The prevalent curriculum of the school has been relied upon to gain the desired results in all these directions. That the child's powers expand during the period of education in the school is evident. Just how far this expansion is due to the school-studies has never been settled. Moreover, the character of the outcome of schoolwork is usually conceived in a very indefinite manner.

The disciplinary value of instruction has, in the history of education, been especially emphasized to defend the teaching of such subjects as have ceased to have value for their contents. When Latin came to be no longer a living language, its advocates strove to retain its supremacy as a school-study by alleging its great importance in training the mind. This idea was in entire accordance with the psychological conception prevalent until the time of Herbart. The mind was thought to be made up of certain faculties — as perception, imagination, memory, reason and will. These were regarded as largely independent of each other and as capable of dealing with any subject equally well. Perception, trained to notice the terminations of Latin words was thought to be well-prepared to notice flowers or countenances.. Memory, cultivated by learning forms and rules of syntax by heart, was expected to show increased strength in the practical exigencies of life. Especially were reasoning power and will believed to be strengthened by the discipline of the school. Indeed, the religious conceptions of the time found in the bare and uninteresting exercises of formal study the appropriate instrument for bringing the inclinations to heel and thus developing character. (See CHILD-STUDY and INTEREST.)

The Herbartian conception of mental activity as apperception (*q. v.*) involved the rejection of the faculty theory. Thinking was by Herbart regarded, not as the reaction of certain powers of the mind upon things brought to their attention, but rather as the interaction of old and new experience. It is not that the mind relates one thought and another. Instead, one thought apperceives or assimilates another, that is, relates itself to the other. What we have perceived determines what we shall perceive. What we remember enables us better to remember related material. Reasoning power means an equipment of knowledge of laws and principles that the mind can use. It follows that one may learn to observe, remember, reason and decide well in certain fields and not appreciably gain strength in others. The lawyer may prove a tiro in noticing the symptoms of disease, although he may be keen enough to watch the significant expressions on the face of a witness, and, while his mind may be brilliant in summoning up and applying legal principles, he may show lack of even common sense in business matters.

In spite of these facts, however, common opinion has so long entertained the idea of a general discipline of the mind that it would seem that there must be some truth in the notion. The developments in recent years have brought the matter to a clearer test. The expansion of the curriculum of the school (see EDUCATION, MODERN) has led to keen competition among subjects of study, a competition fostered by the elective system. On the other hand, the older well-established subjects have endeavored to hold their ground by emphasizing their disciplinary value, thus warding off the possibly dangerous consequences of a comparison based on the value of subject-matter. The followers of Herbart have insisted that all studies should justify themselves not only by their disciplinary results but by the worth of the knowledge they offer. The mass of teachers have, however, conservatively clung to the idea of discipline, and have not seen fit to revise the curriculum in the interest of abandoning all subjects having a purely formal value. In this emergency the matter has been taken up experimentally, and some results of considerable significance have been attained. For example, Professors Thorndike and Woodworth, American psychologists, have discovered that after gaining by practice great facility in estimating the length of short lines there was no marked improvement in ability to judge the length of long ones. It must be said, however, that the experimenters eliminated whatever gain came from becoming familiar with a standard length into which new lengths might be analyzed. Similarly, improvement in ability to memorize one subject, as the plays of Shakespere, will not appreciably help one in learning another, as the rules of grammar, except so far as one learns to apply himself and how to use a few methods of memorizing that are valuable in any material. (See MEMORIZING.)

These results, it will be seen, are largely negative, but they reveal the secret of such general ability as is developed by the special study of certain subjects. So far as such study involves certain methods of work that can be used in other subjects or general facts, laws, principles or rules, present in other varieties of experience, a fairly generalized power may be gained. One may learn the value of observation and some fairly general rules for observing from the study of botany, and may consciously apply this knowledge in the study of human actions or art It must be noted, however, that the tendency to transfer habits from one kind of work to another is strengthened by continual practice in such transfer.

If one is taught to be critical in geometry and then is led to apply the same critical attitude consciously toward history and business, one will be far more likely to be critical in matters of politics than if this habit had been developed in connection with geometry alone. So, too, general principles learned from only a few typical facts are less likely to be seen in new applications than if they have been discovered to apply to a great variety of cases. Here, then, is seen the most important use of correlation: It practices one in using his knowledge of facts and principles and his habits of work in connection with the greatest range of material. Thus we may be said to receive a really effective form of mental discipline. See APPERCEPTION, TEACHING, METHOD OF, and MODERN EDUCATION. Consult *Educational Psychology* by Thorndike and *The Educative Process* by Bogley.

Mentone (*mĕn-tō′nĕ*), a French seaport, is on the Mediterranean, near the borders of Italy, 14 miles from Nice. On the north and west spurs of the Alps, 3,000 or 4,000 feet high, shelter it from winter-storms. Consequently the climate is mild, making it a favorite winter-resort for invalids. It is surrounded by beautiful suburbs and by olive-groves and plantations of oranges and lemons. The trade of the region is largely in olive-oil, lemons, oranges and wine. At the eastern end of the bay are the bone-caves, about 88 feet above the Mediterranean, in which many curious remains are found, belonging to prehistoric times. Mentone belonged to Monaco until 1848, when the inhabitants put themselves under the protection of Sardinia. Twelve years later (1861) Sardinia ceded the town to France. Population about 10,000. See Bennet's *Winter and Spring on the Shores of the Mediterranean.*

Men′tor, the son of Alcimus, the friend of Ulysses, to whose care that hero intrusted his son Telemachus when setting out for the Trojan war. On account of the fidelity with which he discharged this trust, his name became a synonym for one chosen to be a guide or instructor of youth.

Mephistopheles (*mĕf′ĭs-tŏf′ē-lēz*), in old legends a character representing the principle of evil or another name for the devil. The name is thought to be derived from the Hebrew, and means "one who loves not light." The character is best known from its appearance in Goethe's *Faust.*

Mercator (*mĕr-kā′tĕr*), **Gerard,** a Flemish geographer of the 16th century, was born at Rupelmonde, Flanders, March 5, 1512, his real name being Kraemer, "merchant," of which Mercator is the Latinized form. He took his degree as bachelor of philosophy at Louvain, but devoted his later years to the study of geography. In 1559 he was appointed cosmographer to the duke of Cleves. He published several important works, including maps and descriptions of France, Germany and Great Britain. He did a great deal to put geographical science upon a secure footing and to popularize the researches of the learned. Some of his later works were of a religious character and were supposed to favor the Reformed doctrines. He died in Prussia, Dec. 2, 1594.

Merca′tor's Projec′tion is that kind of map-making in which the meridians of longitude are drawn as if parallel, the circles of latitude being in consequence all at right angles with them. In order to lay down the sailing-course of a vessel, which in fact is a curve, so that it shall be represented as a straight line and the angle of the course be readily measured upon the chart, it is necessary to represent the surface of the earth as a plane instead of spherical. This requires, of course, that the degrees of longitude, which vanish at the poles, should be represented as the same length that they are at the equator. In order to draw a chart upon which all sailing-courses may be represented by straight lines, sea-maps are constructed according to the scale devised by Mercator, the distances as we go toward the pole being immensely exaggerated. The amounts of these exaggerations are taken from a table of meridional parts. Given then the starting point of a ship and its meridian and latitude at the close of the day, a straight line between these two points found upon a Mercator's chart would indicate its course, and lines drawn parallel with the meridian passing through the termination and one parallel with the latitude of the starting point would at their junction form a right angle. The angle of the course sailed would be found by measuring the angle at the base.

Merchant-Marine. The United States merchant-marine, or body of commercial shipping, affords a strange contrast to other American industrial concerns in that, while other industries rapidly developed, the merchant-marine, between the year 1861 and the European War (*q. v.*) steadily declined. In early colonial days, American shipping was a serious competitor with the English merchant-marine. The navigation acts, which date from 1645, prohibited importation into the colonies in other than English or colonial-built ships, and thus rather favored the shipbuilding industry in America. The ascendency of the American merchant-marine was still in evidence during and after the Revolution. The earlier wars of the French Revolution left the carrying-trade chiefly in the hands of American merchants; and between 1789 and 1798 the registered tonnage of American shipping was augmented 384 per cent. The maximum tonnage was reached in 1861 with a registration of 496,000 tons. The introduction of iron and steel ships was a fatal blow to the American merchant-marine. Britain not only had the start and the advantage of not being hampered by the navigation laws; but she could construct vessels far more cheaply than could America. The American merchant-marine, except for domestic trade and the fisheries, became quite insignificant, amounting in 1902 to only 398,000 tons. Later, however, it began to recover from the blow dealt by British iron shipping and the havoc wrought by Confederate cruisers in the Civil War. With the advent of the European War, and the necessity of building vessels faster than the German submarines could sink them, there was a tremendous revival of shipbuilding, which was greatly accelerated after America's entrance into the conflict. (SEE SHIPBUILDING).

Merchant of Venice, The, a play of Shakespeare, perhaps first produced in 1597, is one of the most popular of the Shakesperian comedies on the modern stage. The Venetian merchant, Antonio, borrows money from the Jew, Shylock, who in a pretended jest sets down as security in the bond a pound of the merchant's flesh, to be taken by him in default of payment. Antonio's vessels are delayed, and the case comes to trial. The friend, for the expenses of whose marriage Antonio had set his name to the bond, is in despair; but Portia, his bride to be, finds a way to save Antonio and foil the murderous intention of the Jew. She appears disguised as a young lawyer, and, failing to touch the heart of Shylock by her plea for mercy, she confounds him by pointing out that according to the bond he may shed no drop of blood and, further, that his life and lands are forfeit in that he has plotted against the life of a Christian citizen. There are several minor plots interwoven with this story; for instance, the old medieval tale of the gold, silver and leaden caskets and the tricks which Portia and her maid play upon their lovers in giving them rings which they swear never to part with, only to win them in their disguise as clerks under a plea of reward for saving Antonio. There is much of wit, romance and poetry in this favorite play, which has ennobled the many medieval sources from which Shakespeare drew.

Mer'cury or **Her'mes,** in Greek mythology, the son of Zeus and the messenger of the gods. He was the patron of thieves, travelers, merchants, rain, good fortune and eloquence, and sometimes is called the god of the wind. He began his career by stealing the oxen of Apollo when only a few hours old and by inventing a lyre out of a tortoise-shell. He was connected with the every-day life of the Greeks more than any other god. His images were found on mountains, by streams, in the streets of their cities, over the doors of their gymnasiums, and were used as guideposts on their roads and to mark the boundaries of their states. He is represented in art with a staff, wings on his feet or shoulders and a low, broad-brimmed hat on his head. Some of the most beautiful specimens of Greek art are statues of Hermes, notably one by Praxiteles. Mercury is the Latin name for the Greek god Hermes.

Mercury or **Quick'silver** is the only metal that is fluid at common temperatures, which gives it its name, meaning fluid silver. It is of a silvery-white color, and runs on a smooth surface, in separate round drops. If it is not pure, the drops will leave a trail. Heat expands it, and cold contracts it regularly down to its freezing-point, which is about 40° below 0°, which explains its use in a thermometer, the range being more than 700 degrees between the boiling and freezing points. When boiled, mercury forms an invisible vapor. Nature mercury or quicksilver occurs in small quantities, usually in connection with mercurial ores. These ores, of which the most important is called cinnabar, are burned in a furnace, and the sulphur, which is combined with the mercury, passes off as sulphurous acid, and the mercury can be collected in a condensing chamber. The Greeks and Phœnicians procured cinnabar from Almaden, Spain. After the discovery of America the mercury of Peru was famous. The larger part of the mercury used in America comes from California, and most of it from one mine, called the New Almaden. Mercury unites with other metals to form what are called amalgams, and this property is made use of in extracting gold and silver from their ores. The amalgam of mercury and tin is used in silvering mirrors, while others are used in gilding and in filling teeth. Mercury is used largely in making philosophical instruments and in the laboratory, and some salts of it are used in medicine and as antiseptics.

Mercury. See PLANET.

Mer de Glace (*mār de gläs*), Switzerland, one of the most noted of Alpine glaciers. At a distance, only a part of this "sea of ice," can be seen, but there are miles upon miles of pulverized rocks ground off from adjacent cliffs and piled up on its sides. Among these are bowlders 20 or 30 feet square, which have been tossed about like mere playthings and landed here. The "sea of ice" lies between these tracts of earth and stones, white and glistening, and looks as if its billows had been instantly frozen, while their crested waves were wildly tossing. Some of these are gigantic, for as the glacier pushes down toward the valley it is distorted into monstrous forms by various obstructions in its way.

Mer'edith, George, an English novelist and poet, was born in Hampshire, Feb. 12, 1828. His first writings were poems, published in 1851, followed in 1855 and 1857 by stories. The series of works for which he is best known began in 1859 with *The Ordeal of Richard Feverel.* Others of his best known works are *Rhoda Fleming, The Egoist, Adventures of Harry Richmond, Beauchamp's Career, Vittoria, The Tragic Comedians* and *Diana of the Crossways*, the latter being deemed the most charming of his novels. His later poetry is in three small volumes, *Poems and Lyrics, Ballads and Poems* and *A Reading of Earth.* Among his later novels are *The Amazing Marriage* and *Lord Ormont and His Aminta.* While not a popular writer, Meredith ranks among the foremost novelists of the day. In 1905 he received the Order of Merit. See *George Meredith* by Le Gallienne and *Some Characteristics* by John Lane. He died May 18, 09.

Merida (*mĕr'ĭ-dȧ'*), a city of Mexico, the capital of Yucatan, is situated on the Gulf of Mexico. It was founded by the Spaniards in 1542 on the site of an ancient city. It has a cathedral, finished in 1598, a university, conservatory of music, museum and public library. Its manufactures are largely molasses, sugar, cigars and cigarettes, rum, leather and soap Population 61,999. Merida is also a state in Venezuela, with a population of 121,593.

Mer'iden, a city of Connecticut, 19 miles north of New Haven. It was made a town in 1806 and a city in 1867. It is a manufacturing place, principally of metal wares, cutlery, cut glass, lamps, chandeliers, novelties, firearms and woolen goods. The Britannia Company, founded in 1852, covers ten acres of floor space with its factories. It manufactures silver-plated ware, and is the largest establishment of the kind in the world. Its well-known trade mark, "1847, Rogers Bros. — A1," is a guarantee of good material and honest work. The International Silver Company, incorporated in 1898, has numerous factories, and because of Meriden's silverwork it is known as Silver City. The Connecticut State Reformatory for boys is here. Population 33,000.

Merid'ian, from *meridies*, midday, noon, is the great circle passing through the earth's surface and the celestial sphere, which passes through both poles of the heavens and the zenith and nadir of any place on the earth's surface. Every place, therefore, on the earth's surface has its own meridian. When the center of the sun comes upon the meridian of any place it is midday or noon there. But, as it is midday at all places directly under that meridian, it is midnight at all places directly opposite upon the other side of the globe. All places under the same meridian therefore have the same longitude. Stars are measured as to their distance from the celestial meridian. In making a map some place is arbitrarily chosen, as Greenwich or Washington, from which longitude is computed by measuring the distances in degrees of their meridians from each other. Since the vast development of railways in the United States it has become more and more important to have all watches mark the same time within certain geographical limits. In consequence, certain meridians have been chosen by the railway authorities as standards of time; and all watches between such meridians, one hour of the sun's journey apart, are set alike. When the distance between two such standard meridians has been traversed, timepieces are so reset as take up or strike off an hour.

Meridian, Miss., a town in the cotton-belt, capital of Lauderdale County in east-central Mississippi, is 153 miles west of Birmingham and 135 northwest of Mobile, Ala. It has a number of educational institutions, including Meridian College, Meridian Woman's Saint Aloysius Academy and Boys' (Catholic) High School, also two conservatories of music, A Widows' and Orphans' Home and Insane Hospital are located here. Its commerce is chiefly in lumber and cotton, and it has corn-mills, planing mills and establishments for the manufacture of cotton, yarn, cottonseed-oil, besides cotton-compresses, cotton gins, foundries and railroad-shops. Population 30,000.

Meristem (*mĕr'ĭ-stĕm*) (in plants), young tissue whose cells are capable of division, which results in a multiplication of cells. The growing points of stems and roots consist of meristem or meristematic tissue, which produces all the tissues which appear in the mature stems and roots. The cambium (which see) in stems is a kind of meristem, which has the power of forming new wood on one side and new bast on the other. All growing organs are meristematic throughout or in some special part until they are fully grown. An appropriate phrase describing meristem is formative tissue.

Mer'ivale, Charles, an English divine and historian, was born in Devonshire in 1808; and died on Dec. 27, 1893. He was educated at Cambridge, where he became both fellow and tutor. He was the preacher for the university from 1838 to 1850, and delivered lectures there in 1861 and in 1864. In 1869 he was appointed dean of Ely. His chief works are *Fall of the Roman Republic* and *History of the Romans under the Empire.* He has also written a *General History of Rome, Early Church History* and *Contrast between Pagan and Christian Society*, and translated *Homer's Iliad.* See his *Autobiography.*

Mer'lin, an ancient British bard, prophet and magician, lived in the 6th century. He was the son of a Welsh princess, and is said to have had miraculous powers from his birth. There are many allusions to him in early English poetry and history; in Spenser's *Faerie Queene;* and in Tennyson's *Idyls of the King.* A collection of his prophecies was printed in the 16th century in French, English and Latin.

Mer'maids, in popular legend, a class of beings, part woman and part fish. They live in the sea, but are often represented as seated on the rocks, — a lovely woman with a human head and body ending in a scaly fish's tail. She has long, beautiful hair, which she combs with one hand, holding the mirror above the waves with the other. They sometimes seem to have exercised a special care of individuals, and often revealed future events. There are stories of their falling in love with men and remaining faithful wives and mothers for a long season, until they found a chance of returning to the sea. There also are tales of their enticing lovers to their ocean homes. The beautiful romance of *Undine* and the story of Melusine are founded on the ancient belief in mermaids. See *Popular Myths of the Middle Ages* by Baring-Gould.

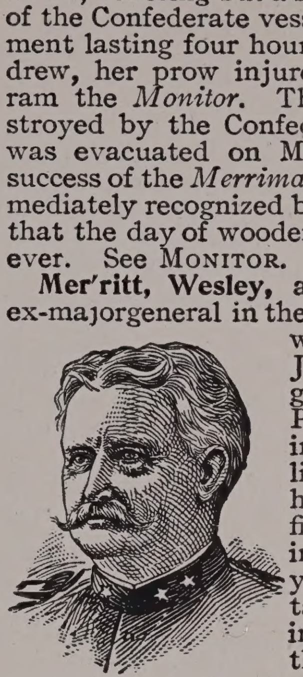
Merovingians (*mĕr'ō-vĭn'jĭ-anz*), the first dynasty of Frankish kings in Gaul. The name was derived from Merwig or Merovech, king of the western Franks, who ruled from 448 to 457. Clovis, the first Christian monarch of the Franks, and Dagobert are the Merwing kings best known in history. The dynasty ended with Childeric III (742–52), who was deposed by Pepin the Short, who founded the Carlovingian dynasty. See *History of France* by Yonge and *The Franks to the Death of Pepin* by Perry.

Mer'rill, Wis., city, county-seat of Lincoln County, is on Wisconsin River, about 145 miles north of Madison. The manufacturing establishments produce planed and sawed lumber, sash, doors, blinds, clapboards, shingles, laths, lumber for interior finish and flooring. It has a court-house, opera-house, high-school and public library. Population 8,689.

Mer'rimac, a river of New Hampshire, formed by the union of the Pemigewasset and Winnepiseogee at Franklin, New Hampshire. It flows south into Massachusetts, emptying into the Atlantic near Newburyport Its numerous falls give a great water-power, which has made the manufacturing towns of Nashua and Manchester in New Hampshire and of Lowell and Lawrence in Massachusetts. It is navigable for 18 miles to Haverhill, Mass.

Merrimac, The, originally was a U. S. frigate, sunk and abandoned in Norfolk Navy-Yard and rebuilt as an armored Confederate war-vessel. She was equipped with two seven-inch and two six-inch rifles and six nine-inch smooth-bores. She was renamed *Virginia*. On March 8, 1862, this vessel stood out of Elizabeth River and attacked the fleet of Federal frigates which lay off Newport News. These wooden vessels proved helpless against the ironclad. The *Cumberland* and *Congress* were sunk; the *Minnesota* was driven ashore. On the following day the *Merrimac* returned to complete the destruction of the *Minnesota*. She was encountered by a formidable opponent in the *Monitor*, which was built with a revolving iron turret "like a cheese-box on a raft," offering but a small target to the fire of the Confederate vessel. After an engagement lasting four hours the *Merrimac* withdrew, her prow injured by an attempt to ram the *Monitor*. The *Merrimac* was destroyed by the Confederates when Norfolk was evacuated on May 9–11, 1862. The success of the *Merrimac* and *Monitor* was immediately recognized by the world as a proof that the day of wooden navies was gone forever. See MONITOR.

Mer'ritt, Wesley, an American soldier, ex-majorgeneral in the United States army, was born at New York, June 16, 1836, and graduated from West Point in 1860. Going into service as a second-lieutenant of cavalry, he was promoted to a first-lieutenancy in the infantry in the next year and made a captain in the year following. At the close of the war he held a commission as lieutenant-colonel in the regular army and was a brevet major-general of volunteers. After the close of the Civil War he was promoted in regular order of service through successive grades until he was made major-general (1895). He commanded a cavalry division in the Shenandoah campaign and rendered conspicuous service at Five Forks, Gettysburg, Fisher's Hill. From 1882 to 1887 he was superintendent at West Point. After years of service in Indian campaigns in the west he was assigned in May, 1898, to the command of the forces in the Philippines. Subsequently he commanded the department of the east, with headquarters at Governor's Island, New York. In 1900 he retired from active service with his rank of major-general. Died Dec. 3, 1910



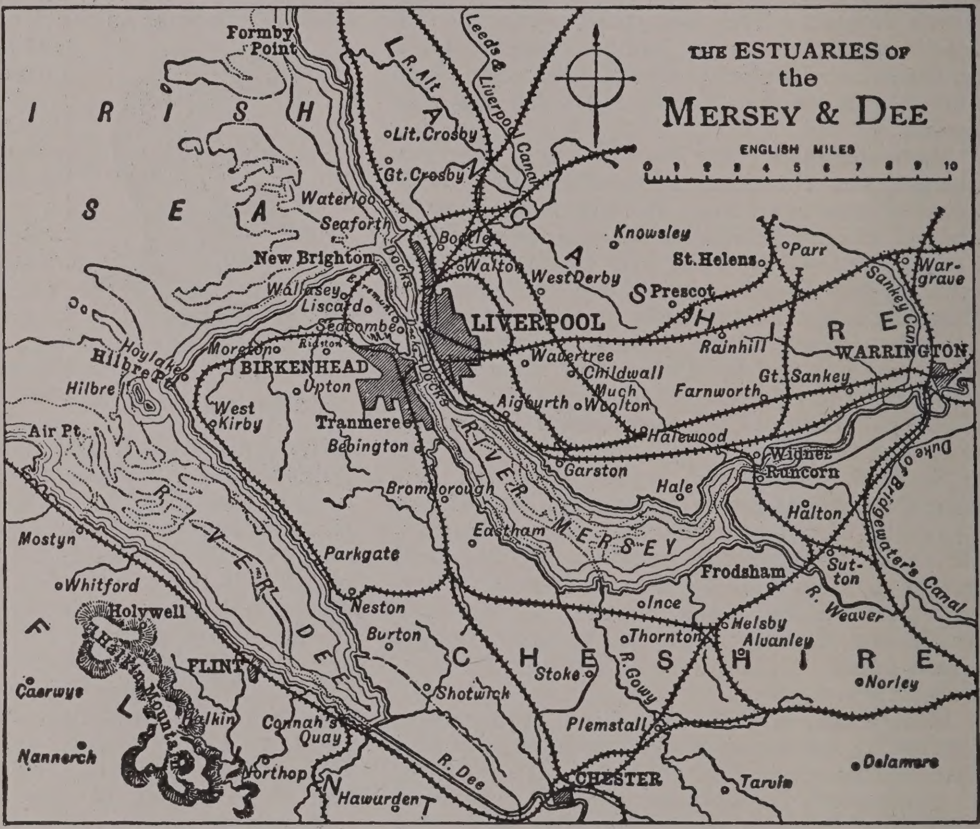
GEN. MERRITT

Mersey (*mĕr'zĭ*), an important river of England, flowing into the Irish Sea near Liverpool (*q. v.*). About 17 miles from its mouth it forms an estuary or inlet from two to three miles wide. The river has been made navigable from Liverpool to Manchester by a ship-canal, while a railroad-tunnel connecting Liverpool and Birkenhead passes under it. The country along its banks is very fertile, and by walls along parts of the river that were subject to overflow many thousand acres have been reclaimed. The river is 70 miles long.

Merv, an oasis in Turkestan, Russian Central Asia, near the northeastern corner of Persia It is 60 miles long and 40 wide, and crossed by Murghab River, its area being

1,600 square miles. It has a hot, dry climate and produces wheat, sugar, cotton and silk. About 250,000 Turkomans live in the oasis, where there are a town also called Merv and a Russian fort opposite, with a garrison of 3,000 men. The Russians, who have held it since 1883, have built a railroad across it from the Caspian to the Oxus. The oasis is 200 miles from Herat. See *The Merv Oasis* by O'Donovan.

Mesas (*mä'säs*), Spanish for tables, are table-shaped plateaus in the Colorado district. There are many such, indicating the places where a hard surface-rock has protected the underlying strata from the action of water, which has eroded the greater part of the adjacent plain. Some of the Coloradan and New Mexican plateaus were the strongholds of primitive races. Dwellings in the rocks, stone implements and even mummies have been found upon *Mesa Verde* in southwestern Colorado and almost inaccessible *Enchanted Mesa* in central New Mexico.


THE ESTUARIES OF the MERSEY & DEE
ENGLISH MILES
0 1 2 3 4 5 6 7 8 9 10
IRISH SEA
Formby Point
R. Alt
Leeds & Liverpool Canal
Lit. Crosby
Gt. Crosby
Waterloo
Seaforth
Bootle
Walton
West Derby
Knowsley
St. Helens
Parr
Prescot
Warrington
Sankey Canal
LANCASHIRE
New Brighton
Wallasey
Liscard
Seacombe
Moreton
Bidston
BIRKENHEAD
Oxton
Hoylake
Hilbre
Hilbre I.
West Kirby
Tranmere
Bebington
Air Pt.
LIVERPOOL
Wavertree
Childwall
Much Woolton
Aigburth
Rainhill
Farnworth
Gt. Sankey
WARRINGTON
Halewood
Garston
Hale
Widnes
Runcorn
Halton
Duke of Bridgewater's Canal
Bromborough
Eastham
RIVER MERSEY
Mostyn
Whitford
Holywell
Halkin Mountain
FLINT
Caerwys
Nannerch
Halkin
Connah's Quay
Northop
Hawarden
Parkgate
Neston
Burton
RIVER DEE
R. Dee
Shotwick
Ince
Thornton
Frodsham
Sutton
R. Weaver
Helsby
Alvanley
Stoke
R. Gowy
Plemstall
CHESHIRE
Norley
CHESTER
Tarvin
Delamere

Meshed (*mĕsh-hĕd'*) (place of martyrdom), is the principal city of northeastern Persia. It is the capital of Khorasan, and the sacred city of the Shiites, the heterodox Mohammedans, 100,000 pilgrims visiting it yearly. There are splendid sepulchres of Haroun-al-Raschid and Nadir Shah and, near by, that of Firdusi the Persian poet, several colleges and a palace. Rugs, carpets, velvets, swords and silk and cotton goods are manufactured, and turquoise jewelry from the turquoise mines of the region. Population 60,000 See *Persia* by J. Bassett and Benjamin's *Persia and the Persians* in the Story of the Nations Series.

Mes'mer, Friedrich Anton, a German physician, was born near Constance, Switzerland, May 23, 1733. He studied medicine at Vienna, and, when he took his degree, presented a paper in which he tentatively introduced his theory of animal magnetism. Studying the properties of the magnet still further, in 1772 he concluded that there was a power in the universe like magnetism, which exercises a secret influence on the human body, which he called animal magnetism. (It is also called mesmerism.) In 1775 he published an account of his discovery, and in 1778 went to Paris, where he created a great sensation and received large sums of money. The French government offered him the use of a hospital and a pension of $4,000 yearly, if he would instruct three assistants in his new methods, but he refused to reveal his secret. The government appointed a commission in 1785 to investigate the system. This commission, composed of such men as Franklin, Lavoisier and Bailly, reported unfavorably, and he lost his pupils and a large practice, retiring to Switzerland, where he died at Baden, March 5, 1815. See *Mesmer the Magnetizer* by P. Anderson-Graham.

Mesophyll (*mĕs'ô-fĭl*) (in plants), the tissue of foliage leaves whose cells contain chloroplasts. As a consequence, the mesophyll is the essential working tissue of leaves and gives their green color. It is bounded above and below by colorless epidermal layers, and is traversed by the vein system. See LEAF.

Mesophytes (*mĕs'ô-fīts*), plants which live in conditions of medium moisture and fertile soil. They are distinguished in this regard from the hydrophytes or water-plants, and the xerophytes or plants of dry soil and air. Mesophytic conditions are those adapted to plants which man cultivates. In case an area is hydrophytic, it is drained and made mesophytic; in case it is xerophytic, it is irrigated and made mesophytic. In contrast with hydrophytes and xerophytes, the mesophytes are far richer in leaf-forms. All of the societies which man has formed by his introduction of weeds and culture-plants are mesophytic. Among the more conspicuous mesophyte societies the following may be mentioned: arctic and alpine "carpets," characteristic of high altitudes and latitudes, where the conditions forbid trees, shrubs or even tall herbs; meadows, which are areas dominated by grasses, the prairies being the greatest of meadows; thickets, composed of willow, alder, birch etc., deciduous forests, and rainy, tropical forests where the world's vegetation is thickest, composed of all sorts of trees, shrubs and herbs.

Mesopotamia **(Iraq),** *mĕs′ō-pȯ-tā-mĭä*, means "between the rivers" and is applied to the country between the Tigris and Euphrates Rivers. Its capital is ancient Bagdad, and it was once one of the richest regions on earth, for the commerce of the East and West met in its markets. The country has belonged to the Assyrians, Babylonians, Persians, Greeks, Romans, Arabs, and Turks, the last race mentioned conquering the land in 1515. Since it fell to the Turks, commerce and industry have languished, and its population at present is under one and a half millions.

Following the World War Mesopotamia, now called Iraq, became an independent country under a temporary British protectorate agreement. To the north it is bounded by Turkey, to the west by Syria and Arabia, and to the east by Persia. Bagdad, Kerbela, and Busra are three of its principal cities. In the north is the region of Mosul, rich in oil, which is claimed by both Turkey and Iraq.

The people are by nature agriculturists, crude though the methods of tillage are. The British have started several immigration projects, laid railways, and developed the port of Busra. According to the terms of the treaty with Great Britain, Iraq will gain complete independence within fifteen years from 1922.

The population consists largely of Arabs and Kurds, who keep herds of camels, sheep and goats, and raise wheat and barley. In the hilly regions bands of roving tribes still refuse to recognize the central government, and military forces are employed to preserve order. See ASSYRIA, BABYLON, NINEVEH.

Mesquite (*mĕs-kē′tȧ*) (*Prosopis Juliflora*) is a spiny shrub or small tree, found in Texas and throughout the semiarid southwest, of the family *Leguminosæ*. Its wood is hard and affords a good fuel in limited quantities, while its gum supplies a fair substitute for gum arabic. The long pods offer a sweet, thick, fairly palatable pulp. Bark and wood are used for tanning. The curly mesquite or screw-bean is larger than the common mesquite, although scarcely large enough to be called a tree, growing in company with willows near springs. Its pods are from an inch to an inch and a half in length and twisted into a rigid cylinder. The beans are eaten by Indians. Certain coarse grasses of the southwest are often called mesquite-grass. They are valuable to stock-men, but of little value when cut.

Messi′ah. The best known and most popular of all oratorios. Composed to biblical text by George Frederick Händel (1685–1759) in 24 days. First performed in Dublin on Apr. 13, 1742. This work has the advantage arising from the use of some of the most impressive passages of Scripture, upon which it is a true musical commentary. Some of its airs are unequalled for the expression of religious emotion, and many of its choruses are overpowering in their effect upon the hearer who to musical taste unites devotional spirit

Messina (*mĕs-sē′nȧ*), the second city and seaport of Sicily, lies on the western shore of the Strait of Messina. The city rises in an amphitheater, its white houses standing in relief against a background of hills. The city, although ancient, has few antiquities, as it was overrun by armies, nearly destroyed by an earthquake in 1783, and again in 1908. It has one of the finest harbors in the world. The industries are the manufacture of linen, muslin and silk goods, working coral and making fruit-essences; the exports are largely fruits and articles made from fruit, as olive-oil, wine and essences. The city was founded in 732 B. C., and the Carthaginians destroyed it in 396 B. C. After Carthage was conquered it belonged to the Roman empire, until the Saracens took it in the 9th Christian century. They were expelled in the 11th century by the Normans; and from 1282 to 1713 the Spaniards held it. In 1743 the plague and in 1783 the earthquake completed its ruin. In 1848 it was bombarded by the Neapolitans, and in 1861 was the last place in Sicily to yield to Italy. In the earthquake which occurred Dec. 28, 1908, almost the whole population of 152,000 was wiped out, the dead numbering no less than 60,000, and the injured 80,000. Messina also is a province; area 1,245 square miles; population 568,833.

Metabolism (*mē̇-tăb′ō̇-lĭz′m*) (in plants), all the chemical processes taking place in the living organism. Some of these processes are constructive, *i. e.*, the resulting substances are more complex than before; others are destructive, the resulting substances being simpler than before. Constructive metabolism occurs when a green leaf, acting on carbon dioxide and water under the influence of light, forms sugar, a complex food, and when by further changes this food is built up into living protoplasm. But in respiration protoplasm is decomposed, and carbon dioxide and water, with other less known products, are formed. This is destructive metabolism. The products of metabolism are so many as almost to defy enumeration. See for examples, the thousands in medicinal use describe in the United States *Pharmacopœia.*

Metallurgy (*mĕt′al-lûr′jy*) is the science which deals with the extraction of metals from the ores in which they are found in mining (*q.v.*). Some metals are found as such, and are then said to be free, native or virgin metals. Gold and platinum usually occur free; silver, copper and bismuth often so. The other metals, as iron, lead, tin, zinc, nickel, mercury, antimony and aluminum invariably, or almost invariably, occur mineralized, that is, in combination with other elements as oxides, sulphides, sulphates, carbonates, silicates or chlorides.

Ores, as they are found and mined, usually contain large quantities of worthless materials, called gangue, consisting of common rocks and minerals. Such ores often are washed by machines called jigs, vanners, etc. to separate or *concentrate* the valuable material. In this process the lighter gangue is carried away by water and the heavier valuable minerals are collected. Usually it is necessary to crush and sort the ore by sieves before the operation is carried out. Where free gold occurs in sand or gravel a simpler method of washing is used. A stream of water carries the material through a long trough or sluice, the bottom of which is provided with grooves or riffles in which quicksilver (mercury) is placed. The heavy gold sinks to the bottom, and is there held by the mercury as an amalgam.

Treatment with mercury or *amalgamation* is often applied to compact ores of gold and silver in stamp-mills, which consist of arrangements like mortars and pestles worked by machinery. The stamping is usually done in the presence of water, and as fast as the ore becomes fine enough it passes with water through screens and over copper plates covered with a layer of mercury, where the valuable metals are caught. Mercury is also placed on plates within the mortar. Ores containing sulphides, tellurides etc. require heating in contact with air, or *roasting*, to burn off sulphur and other impurities before they are treated by amalgamation. Common salt is usually added to silver ores of this kind before roasting.

Certain gold and silver ores are powdered and leached, that is, lixiviated, with solutions of chemicals to dissolve out the precious metals. For instance, a weak solution of potassium cyanide is used to dissolve free gold in the *cyanide process*, and solution of sodium hyposulphite is employed to dissolve silver chloride from ores that have been roasted with salt.

The most important metallurgical process is *smelting*. In this operation the ore, often after it has been concentrated, and frequently after it has been roasted, is mixed with a *flux*, if necessary, and melted at a high temperature. The earthy materials of the ore with the flux form a fluid *slag*, while the action of the fuel, or other chemical action, produces a molten *metal* in some cases or, in other cases, a fused mixture of sulphides, called *matte*, which is much richer than the original ore in the amount of valuable metal it contains. In iron-smelting the ore, mixed with coke or coal as fuel and with limestone as flux, is fed in at the top of an enormous blast-furnace, a structure somewhat like a barrel in shape, but slenderer and much narrower at the bottom than elsewhere. Hot air, forced in through pipes near the bottom of the furnace, burns the fuel and produces great heat. Metallic iron and slag are formed, and are allowed to flow out from time to time through holes near the bottom; the metal, being heavier, runs out through a hole that is lower than the one used for the slag. The metal is called pig-iron, and is used in foundries for making articles of castiron, as well as for making wrought iron and steel. (See Iron and Steel.)

Copper-ores are smelted in blast-furnaces that are much smaller than those used for iron. They are also sometimes smelted in *reverberatory furnaces*, in which the heating is accomplished by the flame from a coal-fire made in a separate compartment of the furnace or by means of gas. With certain copper-ores, as those containing the oxides or the carbonates, metallic copper may be the direct product of smelting; but the very common ores containing sulphides are at first smelted for copper matte, which consists chiefly of the sulphides of copper and iron. The metal is extracted from the matte by operations in which air at high temperatures burns out or oxidizes the sulphur and iron. When gold and silver are present in copper-ores, the precious metals are found in the metallic copper produced from them and are recovered by electrolytic refining, which consists in dissolving the metal and redepositing it by means of an electric current acting in an appropriate solution. The gold and silver and some other impurities are left undissolved in a finely-divided condition.

Lead-smelting is carried out both in reverberatory furnaces and in blast-furnaces. When galena, lead sulphide, the most common lead-ore, is obtained nearly pure, either directly from the mine or by concentration, it frequently is smelted by roasting it on the bed of a reverberatory furnace until it is partly changed to oxide and sulphate, then raising the heat to fusion and thus causing the oxidized part to act upon the remaining lead-sulphide with the formation of metallic lead and sulphur dioxide gas. The smelting of lead-ores in blast-furnaces is carried out particularly for the sake of obtaining the silver that the ores usually contain and also for obtaining the silver from ores containing little or no lead, which are purposely mixed with lead-ores with this end in view. If a sufficient proportion of lead is produced, practically all the silver (and the gold also) in the ores goes into the lead. The greater part of the silver produced in the world is extracted by lead in this way. If the ores contain sulphides, they are roasted before they are smelted in the blast-furnace. Coke is the usual fuel, and limestone and iron-ore are generally used as fluxes. The silver which lead contains is usually extracted by dissolving small quantities of zinc in the hot, molten metal. As the metal cools, the zinc becomes solid: then it rises to the surface, bringing the silver with it, and is skimmed off.

Zinc cannot be obtained by ordinary smelting processes, because it boils and is vaporized at the temperature at which it is reduced to the metallic state. This metal is therefore obtained by first roasting the ore, if it is the usual sulphide, and then heating it with coal in retorts made of fire-clay. The zinc distills and is condensed and collected.

A distillation process is also used for obtaining the volatile metal mercury from its ores.

Aluminium is not reduced to the metallic state from its compounds by the ordinary smelting processes. The principal method of producing it consists in passing a powerful electric current through melted cryolite in which aluminium oxide is dissolved.

The processes used for obtaining several other metals are similar to those that have been mentioned.

Metallurgy is a very ancient art that has been gradually developed and improved during historical times, but the greatest improvements were made during the 19th century, and they have been largely due to the assistance afforded by advancing knowledge of engineering and of chemical and physical sciences.
HORACE L. WELLS.

Met′als. See GOLD, SILVER, LEAD, IRON etc.

Metamorphosis (*mĕt′ȧ-môr′fō̇-sĭs*), change of form in the life of an animal following the embryo-stage. It may be complete or incomplete; in the former there is change of form and habit, as with toads and frogs; in the latter the newly-hatched young closely resemble the parent, as with grasshoppers, the young differing from adults only in absence of wings. Owing to metamorphosis species are protected. While one form may suffer from certain causes, another form survives and carries on the race. See LARVA, NYMPH and PUPA.

Meteorology (*mĕ′tē̇-ẽr-ŏl′ō̇-jy̆*), the science which deals with the phenomena of the earth's atmosphere. These phenomena may be grouped under three different heads: *aërial* phenomena, including winds, cyclones etc.; *aqueous* phenomena, as rain, fogs, clouds etc; and *luminous* phenomena, as lightning, the aurora borealis etc. This science, which is of enormous importance to our race, is universally recognized as yet in an embryonic state. For subjects ordinarily grouped under this head the student is referred to such individual articles as FOG, CLOUD, CYCLONE, LIGHTNING.

Me′teors are small bodies traveling in large numbers and in many directions through space. They are known as aërolites, fireballs and shooting stars, and may be seen every clear night, sometimes few only, but at other times in showers. The whole number which the earth meets in one day's travel is estimated at 7,500,000, but as this large number weighs in all only 100 tons, many of the meteors must be very small. The air acts as a shield, and offers so much frictional resistance that the meteor generally burns. The aërolites are the large masses which actually fall to the earth. Some of them are of iron, some of stone, some of stone and iron. When their fall is noted, there always are a noise, as of an explosion, and a cloud or smoke and a melting of the mass, at least on the surface, showing the action of heat The iron is combined with nickel, cobalt, copper etc. in a way different from any combination found on the earth, though no new element has been discovered. The falls of aërolites have been more numerous than might be supposed, the British Museum having over 300 specimens of them. The fireballs are brightly-shining bodies seen crossing the sky, and are considered to be aërolites before their explosion and fall. Many hundreds have been observed, Arago giving a list of over 800. They are of all sizes, and travel about 26 miles a second. Shooting-stars may be seen on almost any evening, and if carefully watched will seem to come from the same point in the sky. These points are called *radiants*, and are named for the constellation in which they are found—as the Leonids, a group whose radiant is in the constellation Leo. When there is a meteoric shower, the earth is passing through a group or swarm of these meteors, which are also moving, as the earth does, each in an orbit of its own. The Leonids, which are seen in November, are calculated to move round the sun once in 33¼ years, the earth crossing their track every year, but only meeting the main swarm when this reaches the point of crossing at the same time as the earth. When this happens, there is a meteoric shower, such as took place on Nov. 13, 1833, when the stars fell like snowflakes and fireballs darted back and forth, making the most wonderful display of the kind ever seen. Astronomers predicted another shower in 1866, and it came within a few hours of the time agreed upon. The latest investigations point to a common origin for these meteors and the comets, or rather indicate that meteoric swarms are composed of disintegrated comets. Besides the great November group, other groups are active in August, April, September and October. See Young's *General Astronomy*.

Me′ter. See METRIC SYSTEM.

Met′ric System, The, is an international system of measurement of lengths, surfaces, weights and volumes which was gradually developed as the need for a universal system became more and more imperative. Abbé Gabriel Mouton in 1670 proposed an aliquot part of the circumference of the earth as an international unit of length. Other authorities, including Picard, La Condamine, Jefferson and Talleyrand, favored the length of a pendulum beating seconds. A committee of the French Academy of Sciences, which was appointed in 1790 and included Laplace, Condorcet, Borda, Lagrange and Monge, reported in favor of the tenth-millionth part of a quarter of a terrestrial meridian or the distance from the equator to the North Pole as the standard unit of length. The success of the decimal money-system of the United States appears to have won many advocates for the metric system of weights and measures. The unit recommended by the committee of 1790 was established by decree; and the nomenclature was legally fixed by a law of 1795; but the metric system had still to secure adherents among the masses and abroad. This was effected by the adoption of the report of an international commission in 1799. Standard units were deposited in the Paris archives; and by 1837 the use of the metric system was made compulsory in France in all departments. In 1866 the metric system was recognized by law in the United States. Several attempts have been made to render it obligatory, but it has seemed preferable to allow the system to win its way for a time, as it is doing, on its own merits.

The unit of length is a *metre;* the unit of weight a *gram;* the unit of capacity a *litre.* The equivalent of a metre is 39.37079 inches; of a gram, 15.43235 grains; of a litre 61.02705 cubic inches. A gram has the weight of one cubic centimetre; a litre the volume of one cubic decimetre. Prefixes are used to indicate submultiples and multiples of the units, thus:

Milli —one thousandth part.
Centi —one hundredth part.
Deci —one tenth part.
Deca —ten times.
Hecto—one hundred times.
Kilo —one thousand times.

So a centimetre is the hundredth of a metre, a decimetre the tenth of a metre, a kilogram one thousand grams, and so on. The labor of the calculations and reductions in terms of weights and measures is reduced to a minimum by the simple relation between the units of mass and dimension and by the use of decimal parts and decimal notation. Metres and kilograms constructed of an alloy of iridium and platinum are furnished to countries which need them from the Observatory of the International Bureau, established at St. Cloud in 1878.

Metronome (*mĕt'rō-nōm*), an instrument for dividing or "beating" time, used chiefly in the study of music. As ordinarily constructed, it looks like an inverted pendulum swaying before a pyramid, the pendulum being moved by clockwork and the motion retarded or accelerated by sliding up or down a metal weight appended to the wire. If this weight be near the point of suspension, the motion will be rapid; if near the top, correspondingly slow.

Metternich (*mĕt'tĕr-nĭk*), **Clemens Wenzel Nepomuk Lothar,** Prince, an Austrian statesman, was born at Coblentz, Prussia, May 15, 1773. He studied at Strassburg and Mainz (Mayence). He was appointed Austrian minister to Dresden when he was 28, and two years later became ambassador to Berlin. After the peace of Presburg he was sent as minister to the court of Napoleon. He concluded the treaty of Fontainebleau in 1807, and in 1809 became minister of foreign affairs. He was made a prince of the empire in 1813, and in 1821 became chancellor. The Revolution of 1848, was felt at Vienna, and Metternich was compelled to flee to England. After his return he took no part in public affairs, and died at Vienna, June 11, 1859. In 1880–84 his *Memoirs* were published. See *Metternich,* by Malleson, in the Statesmen Series.

Metz (*mets*), the capital and strongest fortified town of Lorraine, France, on Moselle River. It has a series of forts around it, which were strengthened after the annexation to Germany (1871). The making of saddles and shoes and tanning are its manufactures; and the trade is largely in wine, brandy and preserved fruits. In 1552 it was taken by the French, to whom it was formally ceded in 1648. In the Franco-Prussian War it was occupied by Bazaine, who, after a long siege, surrendered it to the German army. Following Germany's defeat in the World War (*q. v.*) it again became a French city. Population 68,445.

Meuse (*mēz*), a river which rises in France, and flows north to Belgium and into Holland. Turning to the west, it joins the Waal, one of the mouths of the Rhine, and becomes the Maas. Rotterdam stands on the New Maas. The river is 500 miles long.

Mexico (*mek'sĭ-kō*), a city, the capital of the Republic of Mexico, is situated in the midst of the central tableland of the country, 7,347 feet above the sea. It is known in history as the capital of the Montezumas, founded by the Aztecs about 1325. The city was in its full glory when Cortez conquered it in 1521, destroying a large part of the ancient town. He rebuilt it on its present plan, using a company of 400,000 Indians in the work. It was occupied by the Spaniards for 300 years, and has been the scene of revolution and the battlefield for contending armies. It to-day is a modern city in every sense of the word; the political, social, industrial and financial center of the republic, and with its suburbs has a population of 500,000. The principal streets are broad and well-paved; the city is electrically lighted and is served by an electrical car-system which extends to suburban towns. There are numerous parks, of which the Alameda is chief, and many flowery boulevards and drives, including the famous Paseo de la Reforma, stretching between rows of magnificent trees for two miles, from the bronze equestrian statue of Charles IV to Chapultepec. Points of interest are the great cathedral, founded in 1524, with 13 chapels, a century in building and costing $2,000,000; the National Palace, the residence for 300 years of 63 Spanish viceroys and after independence the presidential residence; the National Museum, the vast enclosure filled and its walls hung with the relics of a vanished race; the Art Gallery, School of Mines and the Medical Building; and in the suburbs the Castle of Chapultepec; Guadalupe, the holiest of Mexican shrines; and La Viga Canal, 16 miles long, through a succession of floating islands. There are some manufactures, as cigars, gold and silver work and pottery, but the trade of the city is largely that of a receiving and distributing center. The great sewer completed by President Diaz at cost of $30,000,000, drains the Valley of Mexico into the Gulf, and has made a clean, healthy city.

Mex'ico, a federative republic, rich in natural resources, lies between the United States and Guatemala, in North America. It is as large as Great Britain, France, Germany and Austria together, and is 2,000 miles long and from 130 to 1,000 wide. (Area 767,005 sq. miles.) Lying between the Gulf and the Pacific, it has a coast-line of 6,000 miles and numerous ports on both coasts. The peninsulas of Yucatan and Lower California belong to it.

Surface. The country in the main is a great tableland, reaching a height of over 8,000 feet. High above the plateau tower the snow-capped crests of several volcanoes, most of which are extinct. The highest peaks are Popocatapetl (17,540 feet), Orizaba (17,362 feet), Ixtaccihuatl (16,076 feet), Toluca (15,019 feet) and Colima (14,363 feet). Two mountain-ranges traverse Mexico, running almost parallel to the coast, one along the Gulf of Mexico and the other along the Pacific coast. The former runs from 10 to 100 miles from the coast, with a slight upward incline from the low coast to the foothills, while the range on the Pacific side runs very near the coast. This range has several branches, some crossing the country.

Rivers. The rivers are of little use for navigation, but, marked by numerous cascades, afford abundant waterpower. The largest is the Rio Grande, 1,500 miles long, which forms part of the boundary between Mexico and the United States.

The principal gulfs are those of Mexico, California and Tehuantepec. The largest lake is the Chapala, over 80 miles long and 30 wide. The valley of Mexico has seven lakes, one fresh and six salt water.

Climate. Mexico presents great diversity of climate by reason of differences of altitude. The heat of the torrid zone is experienced on the sea-coast and the low lands adjacent to the Gulf of Mexico. There are two seasons, the rainy and dry seasons. The rains begin usually in June and last until November. The temperate zone lies between 3,000 and 5,000 feet above the sea-level. This may be called the region of perpetual spring. Semi-tropical productions have their home here, mingled with the products both of tropical and cold regions. There are farms where both wheat and sugar-cane grow on the same parcel of ground. Between 7,000 feet above the sea-level and the heights of the mountain-ranges lies the cold region, with a mean temperature of 59° or 60° and with small changes from one end of the year to the other, though the change between sunrise and sunset is often considerable. On the central plateau, high above the sea-level and protected from winds and storms by the mountains, the climate is even, temperate and delightful.

Vegetable Life. There can be no more pleasing or extensive field for the botanist than the tropical forests of Mexico. Here are found 114 different species of building and cabinet woods, including pine, oak, fir, cedar, mahogany, rosewood etc.; 12 kinds of dyewoods, 8 of resinous trees the cacao and india-rubber, copal, liquid amber, camphor, dragon's blood and mastic, 17 varieties of oil-bearing trees and plants, among which are the olive, almond, sesame, flax, cocoa, palm etc. Fibrous plants abound, including heniquen or sisal hemp, ixtle, pita, maguey, jute, flax, ramie, aloe and cotton. In the forest-shades bloom flowers of most brilliant colors and exquisite tints. In the vicinity of Orizaba orchid-collectors may find a paradise.

Animal Life. The animal kingdom is most extensively represented including the puma, jaguar, ocelot, wolves, coyotes and wild-cats. In the southern forests a species of sloth and five varieties of monkeys are found. The armadillo and iguana are common. There also are beavers, martens and otters. Venomous serpents and insects are in the lowlands. In the mountains and foothills are deer, hare, rabbits, quail, partridge and a great variety of birds and ground game. The birds of Mexico are famed for their brilliant plumage, and include 353 species.

Minerals. The mineral wealth of Mexico is boundless, both in variety and richness of deposits. Although the metal-bearing regions have been exploited for 400 years, and fabulous values of precious metals have been mined, it is true beyond question that greater riches remain to be uncovered. Humboldt, early in the last century, estimated the mines in Mexico to number 3,000. Through lack of transportation and inefficiency of primitive mining-methods the industry declined for a time, but the extension of railroads, the introduction of modern methods and the stimulus of the modern awakening under Diaz have brought about a revival of this great industry. New areas are being exploited and large investments of foreign capital are finding rich returns in the opening and development of mines of silver, gold, copper and other metals. The minerals of Mexico include gold, silver, platinum, iron, copper, quicksilver, tin, cobalt, antimony, coal, petroleum, all of these being either worked or known to exist. Mining is carried on in 24 of the 31 states and territories, nearly all of the mines yielding silver, either alone or in combination with other ores. The total annual value of mine products is over $156,000,000, and of silver alone $76,000,000,000.

Agriculture. The shape of Mexico on the map is that of a cornucopia, and the land has been called a "horn of plenty." Not only are her mines practically inexhaustible and her forests rich in precious woods; but her land is wonderfully fertile. The country may be divided into three agricultural regions: the sugar-cane and rubber region in the lowlands; the coffee region in the temperate belt; the region producing cereals in the central tablelands. The first is much the most fertile. Here sugar-cane reaches a height of 25 to 30 feet; the tobacco-plant which grows wild has leaves 25 to 30 inches in length; three crops of corn can be grown in one year; there are 20 species of bananas and many kinds of palms; 5,000 limes have been counted on one lime-tree. Along the river-bottoms are millions of acres of land having a soil 13 to 16 feet deep. The drawback in this region is the suffering entailed by the climate and the insects. The temperate belt is less fertile and is poorly watered, but more healthful and grows coffee abundantly and all kinds of fruits. The lands of the central plateau produce wheat, corn, beans, the agave (maguey) and grapes, and are also adapted to stock-raising. With these natural advantages, the soil has been cultivated only on a very limited scale. Until recently agricultural methods and the machinery and implements employed have been of the most primitive kind. The Mexican government has shown a decided interest in improving these conditions, and through the Department of Promotion has been endeavoring to educate the agricultural classes in scientific methods of cultivation, irrigation, fertilization and drainage of the soil and in the adaptation of different products to the several zones. Aid is rendered by the free distribution of seeds, slips and roots of vines, fruit-trees etc. In fact the incalculable service which has been rendered by the Agricultural Department of the United States government is here being duplicated as far as practicable.

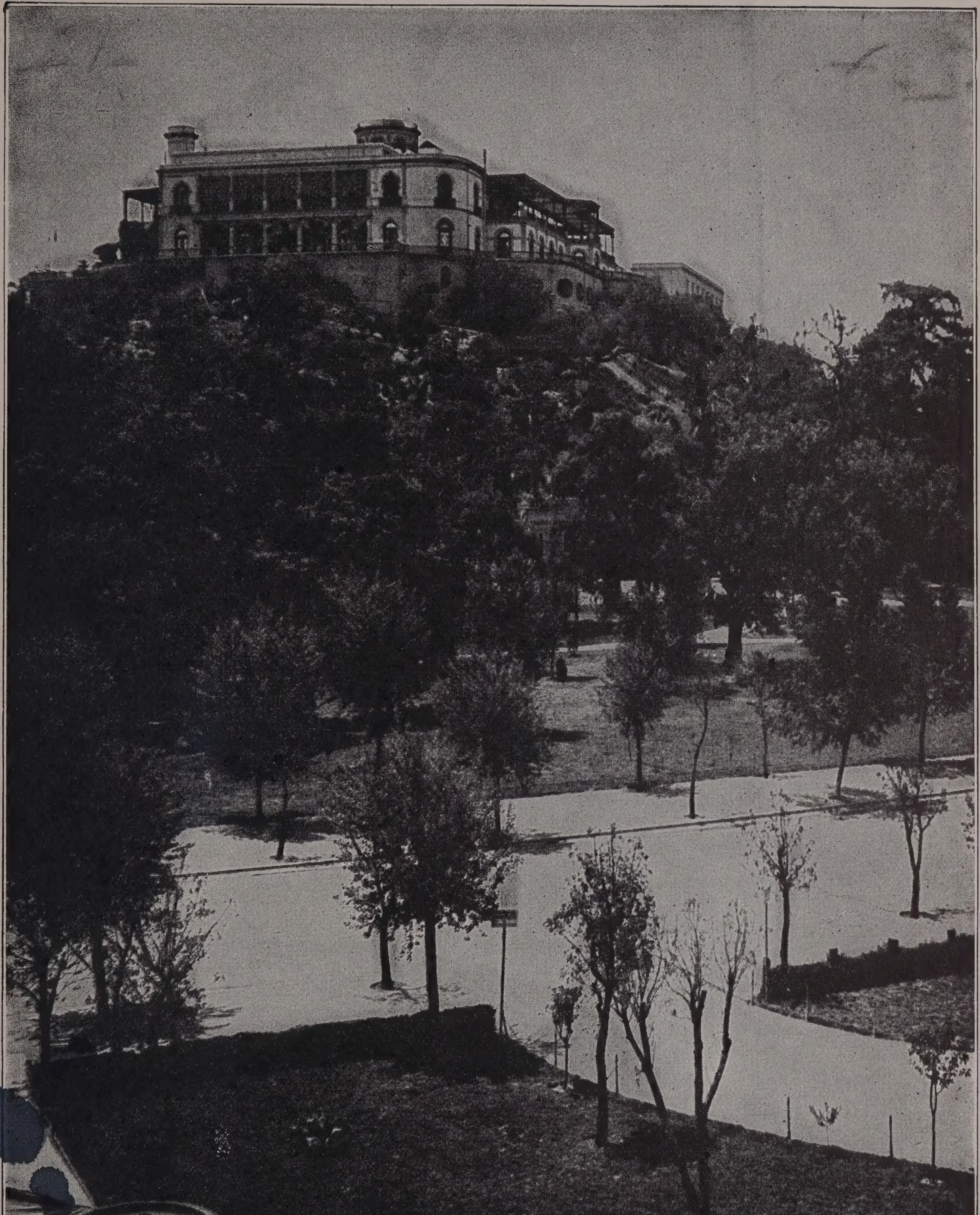
Industries. Mexico has not been a manufacturing country, but with the extension of railroads and the influx of foreign capital and enterprising men a decided impulse has been given to manufacturing industries. One hundred and fourteen cotton mills were in operation in 1904. There also are numerous woolen-mills, and silk-weaving is rapidly increasing. Sugar-mills and flour-mills are many, but do not supply the local demands. Iron-foundries are numerous and profitable, but have been hindered by lack of transportation facilities. Pottery is made in many places, the cities of Guadalajara, Zacatecas, Guanajuato and Puebla being centers of the industry. Other industries are cotton-seed mills, tanneries, manufactures of glassware, hardware, drawn work and feather work. A noteworthy industry is the exporting of hides and skins. Mexico occupies the fourth rank among nations of the earth in this particular branch, the annual export amounting to more than $6,000,000 Mexican silver. The government is doing all in its power to foster home manufacture and has offered great inducements to those who will establish upon Mexican soil enterprises which will utilize its great resources. As a result the country is now making great strides in the industrial and manufacturing field. Smelting and reduction works, waterworks and electric plants are springing up throughout the country.

The capital invested in Mexico by United States companies, firms and individuals, has been stated to be in round numbers $1,000,000,000 gold, and a large part of this investment was made within a few years. Of the total 70 per cent is invested in railroads, the rest in mining and agriculture. United States firms have built many electric light and power plants, waterworks plants, telephone systems and similar plants.

English capitalists have also invested heavily in Mexican enterprises, particularly in connection with the development of the oil fields.

Education. In all the states education is free and compulsory. Before the anarchic conditions following the fall of Diaz the number of Federal, State and Municipal elementary schools was 9,194, and of enrolled pupils was 620,476. For secondary instruction there were 36 schools with 4,642 pupils, and for professional instruction 65 institutions and colleges, including 20 normal schools. In all the Federal, State and Municipal schools there were 18,310 teachers, and the school expenditure amounted to $8,344,430. In addition there were 2,400 private schools with an attendance of 122,161.

The prevailing religion is Roman Cath-



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CASTLE OF CHAPULTEPEC, MEXICO

CATHEDRAL. MEXICO CITY

olicism, but the church is independent of the state, and all religions are tolerated.

Population. The population of Mexico, according to the census of May 15, 1930, is 16,404,030, an increase of 14.4 per cent since 1921. Of the total population in 1930, 4,620,880 were Indian; 9,040,590 of mixed race; 2,444,466 pure white; 140,094 of unknown racial origin, and 158,000 foreign-born. The chief cities, with their populations in 1930, are: Mexico, D. F., the capital, 968,443; Puebla, 111,791; Guadalajara, 153,000; San Luis Potosi, 73,205; Tampico, 76,000; Leon, 53,639; Monterey, 129,748; Merida, 91,139; Vera Cruz, 70,000, and Torreon, 65,000. In 1931 Mexico, D. F., then called Mexico City, annexed several suburbs, which increased its population to more than 1,000,000.

Government. A new Constitution, amending that of 1857, was adopted on February 5, 1917, and amended in 1929. Mexico is a federative republic divided into twenty-eight States, one Federal District and two Territories. Each state has its own local government. The Federal Government is administered by a President elected by direct popular vote for a term of four years. The President carries on the administration by the aid of a Council consisting of eight Secretaries of State and four Departments of State. Congress is comprised of a Senate of fifty-eight members and a Chamber of Deputies of 185 members, elected for two years by universal suffrage, on a basis of proportional representation. Congress meets annually from September 1 to December 31.

Mexico. On January 1, 1934, the Republic of Mexico enforced one of the major provisions of the Six Year Plan proposed by the National Revolutionary Party, the dominant political group in Mexico today. The plan was originally designed for enactment in December, 1934, when a new Presidential term begins. Under President Abelardo L. Rodriguez, however, the Republic is attempting to reconstruct industry and the economic machinery of Mexico during the current year. Towards this end the Mexican National Congress, before its adjournment in December, 1933, granted President Rodriguez special powers for the remainder of his term of office which will enable him to complete the program of reconstruction.

The extraordinary powers granted President Rodriguez place almost complete control of every branch of government in his hands for a nine months' period. Included among these new powers accorded the President is that by which he may amend and revise the petroleum laws of 1926 and 1930 before the Mexican Congress reconvenes on September 1, 1934. Acting under his new authority the President may also amend the naturalization laws, reorganize both the diplomatic and consular service, accelerate reform in the civil and criminal codes, enact public health laws, and declare a code of mercantile laws. Prior to the granting of these extraordinary powers to President Rodriguez he had already been empowered to act in matters of State finance, national defense and agrarian reform.

The new law which was effected at the opening of the current year provides for a minimum wage of 1.50 pesos (approximately forty cents) for Mexican laborers. A higher minimum wage was granted laborers in certain industries which resulted in several writs of injunction being secured against the wage scale. This was especially true of the petroleum industry. In the Tampico district, the Aguila and Guastica Refining Company and a large factory protested against the new legal wage scale. An increased unemployment problem resulted. President Rodriguez on January 9, offered his reply to the protest of employers. He stoutly defended the new government program and appealed to all employers to co-operate in the attempt which was being made to provide Mexican labor with a living wage.

"Federalization" of the electrical industry has also been proposed in Mexico. The law which will effect such "federalization" was passed by the Mexican Congress in November, 1933, but awaits ratification by a majority of State Legislatures before becoming a legal law. The Republic hopes to accomplish the extension of electricity to all industry in Mexico.

The Six Year Plan further provides for (1) the direct intervention of the Government in foreign trade through a commission which will control all imports and exports; (2) extensive irrigation projects; (3) cultural improvements; (4) an improved merchant marine; (5) sanitary improvements; (6) establishment of confidence in the Government both at home and abroad. The plan is an extensive social experiment aimed at raising the standard of living among laborers, and establishing a fixed minimum wage to make the higher standard of living a reality. According to General Calles, who proposed the plan which has since been elaborated by the Rodriguez Government, the Six Year Plan is based on "study, statistics, and lessons of experience, and although more radical programs could be promulgated," to make social experiments at the cost of the hunger of multitudes is a crime.

Preparations for the July elections, at which time a new President of Mexico will be elected, are well under way. The candidate of the National Revolutionary Party is General Lázaro Cárdenas who entered upon his campaign on January 15. In his speech at Toluca he warned against any foreign intervention in the campaign. The Radical Party nominated former Governor Adalberto Tejeda of Vera Cruz as its candidate.

General Cárdenas is a descendant of the Tarascan Indians. He is well known throughout Mexico having been Governor of the State of Michoacan, president of the National Revolutionary Party, and member of the Cabinet in two governments. He has agreed to take over the responsibility of government in its entirety and to appeal to leaders of the National Revolutionary Party for advice. He is a strong advocate of the Six Year Plan and further endorses the (1) enforcement to the letter of anti-clerical laws; (2) the policy of repatriating Mexican émigrés, and (3) the opening of new fields in public life for women. General Cárdenas holds that the army is and "must continue to be the stronghold of proletarian tendencies and the source of information for our social evolution."

Land distribution has ever been a perplexing problem to the Republic of Mexico. For many years land has been heavily exploited by landed proprietors. The National Revolutionary Party advocates a redistribution of this land. Under the plan outlined by the party, present owners will be required to prove title to the land held as far back as the Spanish conquest when the Indians were deprived of their land. The aim is to restore these lands to descendants of the original owners.

On February 16, a decree was issued by the Mexican Department of the Interior providing new immigration regulations. Henceforth all foreigners (laborers and business men) will be denied permission to enter Mexico, unless an investment of 20,000 pesos is made for industry or agriculture. Representatives of foreign commercial companies now resident in Mexico will be required to prove such residence necessary. Before a permanent Mexican residence can be established by any alien, he must reside there for a period of five years abiding by the law of the Republic. Professional men, artists, and educators are not included in the decree issued by the Department of the Interior.

Trade between the United States and Mexico has steadily increased during recent months. Fernando González Roa, Mexican Ambassador to the United States, has been in conference with state department officials with regard to negotiating a reciprocal agreement. Mexico is seeking an increased market for its liquors, fruits, and cattle, while the United States is looking for an increased market for its manufactured articles chief among which are steel, automobiles and agricultural machinery. The proposed pact is expected to meet the demands of both countries.

The 1934 budget calls for a total expenditure of 243,000,000 pesos (approximately $70,000,000), an increase over that of the 1933 budget. Twenty-five per cent of the whole budget, 61,118,189 pesos, was appropiated for the army. An increased appropriation was voted for internal and external debts, 40,669,180 pesos being granted for that purpose. The two fields in which much needs to be accomplished in Mexico are education and roads. An appropriation of 31,235,183 pesos was voted for education and 30,429,054 for roads.

Territorial Division. The territory of the United Mexican States is divided into one Federal District, twenty-eight States and two Territories, whose organization is almost identical with that of the American Union. The States, as before indicated, are free and sovereign in all matters pertaining to their internal administration, their government being vested in three heads, namely: State government, State legislature and State judicial power. The States and Territories are, for convenience, classified as follows, according to their situation:

Central States. Federal District, Aguascalientes, Durango, Guanajuato, Hidalgo, México, Morelos, Puebla, Querétaro, San Luis Potosi, Tlaxcala and Zacatecas.

Northern States. Chihuahua, Coahuila, Nuevo León and Sonora.

Gulf States. Campeche, Tabasco, Tamaulipas, Veracruz, Yucatán and Territorio de Quintana Roo.

Pacific States. Baja California, Colima, Chiapas, Guerrero, Jalisco, Michoacaán, Oaxaca, Sinaloa and Tepic (Nayarit).

The two Territories are Tepic (Nayarit), and Baja (Lower) California.

History. The early history of Mexico, as recorded in its monuments and picture-writings, includes two periods—that of the Toltecs and the Aztecs. The Toltecs are thought to have reached the country about the eighth century. They cultivated the land, introduced corn and cotton, made roads and built temples, cities and monuments whose ruins still prove their skill. To their invention are thought to belong the Mexican hieroglyphics, or system of writing by pictures, and the Mexican calendar. They are believed to have been driven south by famine and pestilence to Guatemala and Yucatan in the eleventh century. After an interval, about the end of the twelfth century, the Aztecs entered the land and founded, about 1325, the city of Mexico. They were a less cultivated race than the Toltecs, but more so than the North American tribes, although they are considered now as belonging to the same family. The Spaniards under Cortez landed at Vera Cruz in 1519, and the story of the latter's conquest of Mexico is one of the romances of history. In 1540 all the American territory belonging to Spain, including Mexico, was united under the name of New Spain, and governed by viceroys appointed by the home government. The policy of the government, however, hindered the development of the country. Mexico was looked upon simply as a mine to be worked for the benefit of Spain. The natives were distributed as slaves on the plantations, and trade with any country but Spain was forbidden under penalty of death. In spite of this policy, however, it was one of the richest and most prosperous of the Spanish colonies. After three centuries of submission the spirit of discontent, which had been growing during the wars of Spain with France under Napoleon, broke out in rebellion in 1810, under the leadership of a country priest named Hidalgo. In 1821 the last of a series of fifty-seven Spanish viceroys, O'Donoju, surrendered the capital. General Iturbide was proclaimed emperor in 1822, but General Santa Anna raised the standard of the republic, and Iturbide was banished to Italy, and shot the next year when he attempted to return. From that time on the history of Mexico is one of civil war until 1876. Fifty-two presidents or dictators, one emperor and a regent ruled the country in that time.

Texas secured its independence in 1836, and in 1845 became a part of the United States. The boundary line was unsettled, and a dispute over a strip of land brought on war with the United States, with its battles of Monterey, Palo Alto, Cerro Gordo, Buena Vista and Chapultepec, ending with the taking of the City of Mexico by the Americans under General Scott. Peace was concluded in 1848, Mexico ceding to the United States half a million square miles of her territory. In 1861, under the presidency of Juarez, the country was again involved in war with the allied troops of England, France and Spain, partly as the result of some of the internal changes made by Juarez, such as the separation of church and state and the confiscation of church property, and partly because of acts of injustice to foreigners during this period of disorder. The difficulties were regulated by a treaty, to which the French commander, however, did not agree. Spain and England withdrew their forces, but France declared war, and entered the City of Mexico in 1863. The crown was offered to Archduke Maximilian of Austria, who was declared emperor. After the withdrawal of the French troops from the country, owing to the remonstrance of the United States based on the principle of the Monroe Doctrine, the republican troops under Juarez defeated the army of the emperor, who was taken and shot in 1867.

In 1876, after another revolution, Porfirio Diaz, the ablest of Mexican rulers, became president. He was re-elected continuously until in 1911 a revolution resulted in his resignation and the election of Francisco Madero, who, in turn, was deposed and shot under mysterious circumstances, and General Victoriana Huerta, made Provisional President. Disorder continued, however, throughout the nation. In April, 1914, United States sailors, going ashore for supplies, were arrested at Tampico and the flag insulted. An apology was demanded, and on Huerta's refusal, American war vessels landed troops and seized Vera Cruz after an engagement resulting in the killing of a number of Americans.

Before the period of anarchy following the fall of Diaz, Mexico had fifteen million people, one-third of whom were Indians. The ruling class was of Spanish blood, although many leaders, including Diaz, were half-breeds.

General Carranza became President in 1917. Soon after, General Alvaro Obregon revolted, Carranza was killed, and Obregon elected president in 1920. He chose Plutarco Elias Calles Secretary of War and Adolpho de la Huerta Secretary of the Treasury. It was understood that Calles should succeed Obregon, but when the time came other presidential aspirants (among them Huerta) appeared on the scene. From December, 1923 until April, 1924 warfare raged. The rebels, under Huerta, held the important harbor of Vera Cruz on the east coast, and Guadalajara, Mexico's third largest city, on the west coast. President Obregon, one-armed and courageous, took active military charge. The rebels were beaten, and Calles elected President, in 1924. He was forty-seven years of age. He had been a school teacher for seventeen years, and was the leader of the Labor party. He set to work quietly breaking up the landed estates, and turning them over in small divisions to those unpossessed of land. He recognized personal property, but was opposed to the aristocratic order of society which has so long been established in Mexico.

General Alvaro Obregon, elected to the Presidency with opposition on July 1, 1928, was assassinated on July 17. President Calles acted as Provisional President until the election of Emilio Portes Gil on September 25, to serve until February 5, 1930. A rebellion in 1929, centering in Vera Cruz and Sonora and six of the northwestern states, lasted from March until May. In June, 1929, the church controversy was settled, and the churches, which had been closed since the bitter struggle of 1926, again held services. The struggle had centered chiefly on property, between Church and State, and in 1931 was renewed over individual state legislation, limiting the priests in proportion to the population. Pascual Ortiz Rubio was elected President to serve from February 5, 1930, until November 30, 1934. He resigned on September 3, 1932, because of ill-health, and General Abelardo L. Rodriguez was elected to succeed him. The Republic of Mexico joined the League of Nations after formal invitation by the Assembly on September 8, 1931.

A new social order has been gradually displacing the old order in Mexico for the past decade. The National Revolutionary Party has so increased its power that to-day its principles are becoming law in Mexico. One of the most important proposals demanding the consideration at the next regular session of the Mexican National Congress is concerned with the extension of Socialist doctrines. The proposal was introduced in the Chamber of Deputies in December, 1933, and recommends that Socialist doctrines be made a part of the curriculum in all schools and that religious institutions and ministers be prohibited from "establishing, directing, and teaching in elementary and secondary schools." This recommendation and the proposed amendment to Mexico's Constitution which provided for agrarian reforms, clearly indicate the influence of the Querétaro convention of the National Revolutionary Party upon legislative bodies in Mexico to-day. At that convention in December it was proposed that Article VII of the Constitution be so amended as to provide for "Socialist education as the basis for primary and higher education." In reality the National Revolutionary Party is conducting a vast social experiment. Extensive legislation has already been enacted which looks towards the effective working of the doctrines advocated by adherents of the National Revolutionary Party. The conventions of the party have always been considered highly important in that party policies set forth in these sessions generally become law in a very short time.

Mexico, Gulf of, a basin of the Atlantic Ocean, shut in by the peninsulas of Yucatan and Florida, lies south of the United States and east of Mexico. It extends over an area of 16,200 square miles—more than one fifth of the area of the United States. It is, 1,100 miles long, although Yucatan and Florida approach within 500 miles of each other. The Gulf has a maximum depth of 12,700 feet, and much of its area exceeds 10,000 feet in depth. The coasts are low and sandy, with few good harbors, the best being New Orleans, Pensacola and Havana. Cuba is in the middle of the entrance to the Gulf, dividing it into two straits, that of Florida, which connects it with the Atlantic and that of Yucatan, opening into the Caribbean. The largest river flowing into it is the Mississippi. The Gulf Stream enters the Gulf by the Yucatan Channel, flows around it and passes out by the Florida Strait. The Gulf is visited by severe northeasterly gales called *Nortes,* or Northers.

See GULF STREAM.

Meyerbeer (*mī′ẽr-bār*), **Giacomo,** a German operatic composer, was born at Berlin, Prussia, on September 5, 1791. His real name was Jakob Beer, to which he added the name of Meyer, a benefactor of his, and gave the whole name an Italian form. At the age of seven he played in public the *D minor Concerto* of Mozart. His earlier works were unsuccessful and he proceeded to Italy for further study. He adopted Rossini's style, which was just then popular, and composed three operas. He was crowned with laurel on the stage at Venice in 1824, for the production of his opera *Il Crociato.* In 1831 he produced *Robert le Diable* in an entirely new style, which surpassed his master, Rossini. After the success which followed the production of *The Huguenots* he was appointed Kappellmeister by the King of Prussia. His *Prophet* appeared in 1849. In the comic opera to which he now turned his attention, he wrote *The Star of the North* and *Dinorah.* His last work, *L'Africaine,* was not made public until a year after his death. He published many miscellaneous compositions, a *Stabat,* a *Te Deum,* some cantatas and songs. His operas are popular and frequently produced, especially at the Paris Opera. He died at Paris on May 2, 1864.

Mezzotint (*mĕd′zō̂-tĭnt* or *mĕz′ō̂-tĭnt*), a method of engraving upon metal. In making a mezzotint, a plate of copper is used for the finest results, although steel is also commonly employed. The surface of this metal plate is closely covered with a network of crossed lines of uniform depth. The halftones are obtained by scraping this roughened surface in different degrees, and the high lights by completely destroying the surface and polishing the smooth metal. A blunt instrument, like a chisel with a serrated edge, produces the "ground," and a scraper and burnisher are used in the engraving. Inks of various shades of dark brown are customarily used, although the modern development of the mezzotint has reproduced the original colors.

The mezzotint was invented by Ludwig von Siegen, in 1642. Prince Rupert introduced it into England, where it became a favorite of the engravers. They have excelled all others in the art, at which they were masters during the seventeenth and eighteenth centuries. Mezzotint is especially adapted to portraiture, in which it reached its highest development after 1750. Many of the finest portraits of Sir Joshua Reynolds and his contemporaries were engraved by Macardell, J. Raphael Smith and Earlom. In landscapes, David Lucas achieved the finest results in a series of Constable reproductions. About the middle of the nineteenth century the art, which had been brought to America by Peter Pelham in 1727, began to decline, and has only recently been revived, due to the fashion of collecting prints by the older masters.

Miami, a river which rises in Hardin County in the western part of Ohio and flows south for 150 miles where it empties into the Ohio twenty miles west of Cincinnati. It has a drainage area of 5,400 square miles, two-thirds of which is within Ohio. Miami Canal runs beside it for seventy miles, and together they furnish extensive water-power for manufactures. It is sometimes called the Great Miami to distinguish it from the Little Miami, which runs for 100 miles in the same direction, and flows into the Ohio, six miles east of Cincinnati.

Miami (*mī-ăm′ĭ*), a city and the seat of Dade County, Florida, is situated at the mouth of the Miami River, on Biscayne Bay and the Atlantic Ocean, 366 miles south of Jacksonville. Miami lies at the terminus of the Florida East Coast and the Seaboard Air Line railways. There are steamship connections to all the chief Atlantic ports, to Cuba and the West Indies. Miami is the center of the longest air line in the United States that operates daily. It is served by municipal and private air lines. The United States Navy airport is located there. The city has overnight mail and passenger connection with New York City, and five-day air passenger connection with Buenos Aires and all South American countries.

Miami is famous the world over as a winter playground. During that season the population is more than doubled, and has led to a large trade and industrial section to satisfy these transients. Adjacent to the city extend the Everglades, the vast swamplands of Florida, with their tropical vegetation and brilliant flowers and birds. A giant causeway connects the city with the famed Miami Beach. Other attractions in the immediate city are the alligator farm and the Seminole Indian village. The school system is excellent. At Coral Gables, adjacent to Miami, is situated the University of Miami.

The city is located in the center of a fruit-growing region, and the raising and packing of citrus fruits is the chief occupation. In Dade County, approximately 20,000 acres of vegetables are cultivated, producing 6,000 carloads of tomatoes and other vegetables annually. Truck farming, dairying and poultry raising are among its important industries. Its principal manufactures include lighting fixtures, paints, marine novelties, art cement, reed furniture, pottery, tiles, automobile tops and bodies, clothing, chemicals, disinfectants, cigars, soap, and airplanes. Other important industries are the tanning of snake and alligator skins, shipbuilding, the making of glass, and grapefruit canning. The city is primarily a resort, noted the world over as one of the most popular "winter playgrounds" in America. In 1930 the population of Miami was 110,637.

Miamis, an Indian tribe found in the seventeenth century by the French near Green Bay and on the Fox and St. Joseph's Rivers. They were related to the Illinois tribe and belonged to the Algonquin family. In 1721 they were found along the Miami, the Wabash and the Ohio rivers. In the French and English wars they sided sometimes with one party and sometimes with the other, but during the American Revolutionary War supported the English. They were hostile to the settlers in the region about them. In 1790 General Harmar was sent against them. Under their chief, Little Turtle, they defeated General St. Clair, but after a defeat by Wayne they made peace in 1794. In 1809 they yielded their lands, from the Wabash to the Ohio state line, and after another struggle with the United States troops made peace in 1815. They gave up all their lands in 1838 and 1840, and were finally removed to Kansas in 1846 and from there, in 1873, to the Quapaw reservation in Indian Territory. They numbered, when moved, only 150. They once numbered 8,000 warriors.

Mica (*mī'kȧ*), from a Latin word meaning to glitter, is a group of minerals which are noted as being easily divided into sheets. These sheets can be made so thin that it will take one thousand to make an inch in thickness. There are different varieties, the Muscovite mica being the most common. It is formed largely of silica, alumina and potash, and is called a potash mica. It is found in granite rocks, in gneiss and in layers with quartz, making what is called mica schist. Large plates are sometimes found, as in New Hampshire, Sweden and Norway. Mines have been discovered in North Carolina. Mica is used in stoves and lanterns, because it is transparent and will bear heat. It is used in some countries for window-glass.

Michael Angelo. See Angelo.

Michelson (*mī'kĕl-sŭn*), **Albert Abraham,** a brilliant physicist born at Strelno, Poland, on December 19, 1852. He was graduated from the United States Naval Academy in 1873. He resigned from the navy in 1881 to accept a professorship in physics at the Case School of Applied Science, in Cleveland, Ohio. When Clark University was founded, he resigned to accept a similar position at the new institution. From 1892 to 1929 he was head of the physics department at the University of Chicago. His earliest important work was an improvement in Foucault's method of measuring the speed of light. These researches were carried out at the Naval Academy in 1878-80. His memoirs on the interference of light-waves, on the relative motion of the earth and the ether, on the length of the standard meter in terms of the wave-length of codmium light and on the new echelon spectroscope are so important as to have become classics. He invented the interferometer in 1887, and his experiments with Morley on the relative motion of matter and ether established a basis for the Einstein theory of relativity. He was given honors by many countries, and received the Nobel Prize for physics in 1907. Professor Michelson died in 1931.

Michigan (*mĭsh'ĭ-găn*), "The Wolverine State," and one of the north central states of the United States, is actually composed of two peninsulas, separated by the Strait of Mackinac. The lower peninsula, the largest of the two, is bounded by Lake Michigan on the west; the Strait on the north; Lake Huron, Ontario, Canada, and Lake Erie on the east, and Indiana and Ohio on the south. The upper peninsula is bounded by Lake Superior on the north, Lake Huron on the east, and Lake Michigan and Wisconsin on the south. The State ranks twenty-second in size among the states of the Union. It extends over an area of 57,980 square miles, with the largest water boundary lines of any state in the Union, in proportion to its size. The total length of Michigan's coast line is 1,620 miles, and there are 500 square miles of water within its area, in addition to 16,653 square miles of Lake Superior, 12,922 square miles of Lake Michigan, 9,925 square miles of Lake Huron, and 460 square miles of Lakes St. Clair and Erie. The word "Michigan" is of Indian origin, and probably means "great lake" or "great water."

Surface. The topography of Michigan is remarkably varied for a single state. There are mountains, bluffs, hills, high tablelands, rolling prairies, forests, plains, marshes, great sand dunes, rocky shores, lakes, rivers and many islands. The surface of the upper peninsula is more irregular than that of the lower. In the northwestern section of the State the surface is very rugged, with hills and mountains, rocky, and comparatively barren yet rich in minerals. Some of the Porcupine Mountain peaks rise to a height of 2,000 feet or more, the highest land in the State. Eastward from

Green Bay stretch two ranges of hills, one varying from 100 to 300 feet in height, and the other in places reaching an elevation of 600 feet above Lake Superior. The northern part of the lower peninsula is an extensive plateau. Crossing the peninsula southwest from Saginaw Bay is a depression in which the elevations are less than 100 feet above the lakes. Southwestern Michigan contains the valleys of the St. Joseph, Kalamazoo and Grand rivers, and also rolling uplands and sand dunes rising to heights of 100 and even 200 feet. The soil of both peninsulas is a glacial deposit, which is heavier in the lower peninsula. Southwestern and southeastern Michigan is covered with dark clay loam or muck, chiefly; the north central lower peninsula, with light sandy loam; the shores of Lake Huron abound in heavy blue clay; the northwestern mining district is rocky, barren or thinly covered. The remainder of the State is covered with rich soil which varies in its proportion of vegetable loam, sand, gravel and clay.

The upper peninsula is almost entirely forested, but not as deeply as in former years. Here is centered the mining and lumber district. A great amount of reforestation work is being carried on within the State. In the lower peninsula there are about 5,000 small clear lakes, surrounded by woods and well stocked with fish, a veritable sportsman's paradise. All along the western shores rise the high white sand dunes above Lake Michigan. It is a State of summer resorts and vacationists, popularly called "the playground of a nation" as it furnishes every variety of picturesque scenery. The picturesque rocks, 300 feet high, extending eastward from Munising Harbor, are a scenic wonder. Mackinac Island is famous for its deep green forest patterned by woodland trails. It is rich in Indian legend and history, as is all of northern Michigan. Two battles of the War of 1812 were fought here, and Schoolcraft wrote his *History of the North American Indians* and *The Legend of Hiawatha* which Longfellow later expanded into his famous poem. On the edge of a precipice that rises abruptly 155 feet into the air stands old Fort Mackinac looming over the city. Arch Rock is a notable freak of nature. The St. Mary's river and Rapids which connect Lake Superior with Lake Huron, are in a district of great beauty. The ship-canal on this river has the largest lock in the world, and more ships pass through it than through the Suez Canal. The river falls twenty feet in three quarters of a mile, which necessitated these gigantic locks. One of the most notable features of the lower peninsula is the tulip region. Holland, Michigan, a Dutch settlement with picturesque buildings and a clean fresh air of gaiety, is the heart of the tulip industry. Here a festival is held each spring when the tulip beds are a mass of exquisite bloom.

The largest island is Manitoulin in Lake Huron, with an area of 1,000 square miles. There are 3,000 islands in Lake Huron alone, and many more in the other lakes, large and small, as very few of them are without islands. There are several large bays on the coast, especially Saginaw Bay on the east and the Great and Little Traverse Bays on the west. The largest rivers are the Grand, the Saginaw, the Au Sable, the Kalamazoo and the St. Joseph. The northern sections abound in large and small game.

Climate. The site of Michigan, situated among the Great Lakes, has a decided influence on the climate of the State in the lower peninsula, where the prevailing winter winds are west and northwest. In the upper peninsula they are northwesterly and the lakes affect the temperature very little. Except in the southwestern portion, the State experiences extremes of temperature ranging from 104 degrees in the southeast to twenty-four degrees below zero in the northwest. The mean annual temperature is about forty-five degrees. The climate is very healthful. Hay fever sufferers find relief in northern Michigan. There is an annual precipitation of about thirty-one inches, evenly distributed and falling chiefly from May to October. Exceptionally heavy snow falls along the northern shore of the upper peninsula.

Minerals. The mineral resources of Michigan are of great importance. Iron, copper, and cement are the chief mineral products. Michigan is exceeded only by Minnesota in the value of its iron production, the purest in America, which amounted to 2,554,996 tons in 1932, and 280,536 tons of pig iron. It ranks next to Arizona and Montana in the value of copper production, of which there were 63,898,000 pounds in 1932. The richest copper mines in the world are located near Lake Superior. There were 6,132,768 barrels of cement manufactured in 1931. The bituminous coal fields extend over an area of 10,000 square miles, but the coal is of inferior quality. Only 355,000 tons were mined in 1932. In the central and southeastern sections of the lower peninsula are numerous salt wells, which yielded 2,053,980 tons in 1931. Other important mineral resources include natural gas, petroleum, graphite, asbestos, marl, gypsum, limestone, sandstone, potash and mineral waters. The total value of the mineral production in 1930 was $111,405,530.

Production and Industry. Michigan is chiefly an agricultural State. It is especially noted for the production of cereals, sugar-beets, potatoes and fruits. The great fruit-belt lies in the southwestern section of the State where all the principal fruits are grown. The State leads in small fruit production, and ranks fourth in apples. In 1930, there were 160,732 farms with a total area of 17,118,951 acres, 9,094,000 acres of which were under cultivation. The principal crops, with their productions in 1932, are: oats, 34,101,000 bushels; corn, 48,279,000 bushels; wheat, 16,584,000 bushels; hay, 3,105,000 tons; potatoes, 29,900,000 bushels; sugar beets, 1,184,000 tons, and grapes, 71,775 short tons. In 1932 there were in the State, 1,285,000 sheep; 373,000 horses; 850,000 milch cows; 540,000 other cattle, and 661,000 swine. The wool clip in 1931 amounted to 8,526,000 pounds.

For many years, Michigan has been one of the most important manufacturing states of the Union. It ranks fifth in the value of manufactured products, and sixth in number of employes. The extensive forests, the increasing markets of the West, the ideal location in relation to both eastern and western markets, the exceptionally good means of transportation and the State's extensive mineral and agricultural resources, have been largely contributive to industry. The most important industry is the manufacture of automobiles, in which Detroit is the leading city in the world. In 1929 were produced automobiles, bodies and parts valued at $2,288,064,666, in 164 establishments within the State, employing 214,368 workers who earned $375,727,326. Ninety-seven of these establishments were located in Detroit. In Grand Rapids, in 1929, were seventy-two furniture factories employing 12,036 workers to produce furniture valued at $57,851,118. Other important industries include foundries and machine shops, brass and bronze plants, stoves, planing mills, paper mills and printing establishments. The health foods manufactured at Battle Creek are nationally known.

Transportation. Michigan is excellently provided with transportation facilities. In 1932 there were 8,020 miles of steam railway and 326 miles of electric railway traversing the State. There were also 8,293 miles of highway, of which 7,620 were surfaced. Navigable waterways have been aided by several canals, two of which are at Sault Ste. Marie, one at the St. Clair Flats, and the Portage Lake Canal in the copper district. The 1,600 mile coast line has twenty good harbors for vessels of 2,000 tons, from which its products are transported to the harbors of seven of the leading states in the Union, and also to the harbors of Canada. From the State the iron ore and other minerals of Michigan and Minnesota, as well as lumber and manufactured products move eastward, while from the Great Lakes region Michigan transports large supplies of cereals, flour, timber and coal to the Northwest.

Population. According to the census of 1930, the population of Michigan is 4,842,325, an increase of thirty-two per cent over that of 1920. Of this total, 17.4 per cent were foreign born, chiefly from Canada; 3.5 per cent were Negro, and 68.2 per cent were urban. There was a decrease of 182 per cent in the negro population within the preceding decade. In 1931, there were 1,080 Indians on reservations totalling 191 acres. The chief cities, with their populations in 1930, are: Detroit, 1,568,662; Grand Rapids, 168,592; Flint, 156,492; Saginaw, 80,715; Lansing, the capital, 78,397; Pontiac, 64,928; Hamtramck, 56,268; Jackson, 55,187; Kalamazoo, 54,786; Highland Park, 52,959, and Dearborn, 50,358.

Education. Education is compulsory for children from seven to sixteen years of age. In 1930, the illiteracy rate was but two per cent in the State. In 1930 there were 6,822 school districts for elementary and secondary education, with an enrollment of 1,036,087 and 34,552 teachers. There are four normal schools having an enrollment of 6,771 and a faculty of 604. The chief institution of higher learning is the University of Michigan, which was founded at Ann Arbor in 1841. In 1932, it had an enrollment of 12,387 and a faculty of 815. This university was the first institution to admit women students. The Michigan State College of Agriculture and Applied Sciences, founded in 1857, is the oldest agricultural college in the country. The Michigan College of Mining and Technology, founded at Houghton in 1886, is also important, and there are eight smaller colleges situated at Kalamazoo, Adrian, Albion, Battle Creek, Hillsdale, Detroit, Olivet and Holland.

Government. Michigan is divided into eighty-three counties, each of which is governed by a Board of Supervisors. For city incorporation a population of at least 3,000 is required. The State has a Senate of thirty-two members, and a House of Representatives of 100 members. It is represented in the National Congress by two Senators and seventeen Representatives. Capital punishment, which was abolished in 1846, was voted upon in 1931 with the same result. The sterilization of feeble-minded and other mental defectives has been mandatory on court order since May 23, 1929.

History. Jean Nicollet, a French explorer, is thought to have been the first visitor to the shores of Michigan. He visited Sault Ste. Marie in 1634 and discovered Lake Michigan. In 1668 at Sault Ste. Marie, Father Marquette founded a Jesuit mission for the Hurons, which became the first permanent white settlement in this region. In 1688 Father Marquette renewed this mission and later founded another for the Hurons at St. Ignace, which became a French fort. Antoine de la Motte-Cadillac, in 1701, landed here with a commission from Louis XIV of France, and founded Detroit. Du Luth and La Salle made other settlements. The English obtained possession of the country in 1760, and established garrisons at several strategic points, including Detroit. The Indians, however, under Pontiac destroyed many of these. Detroit was the capital of the British possessions in the Northwest until 1796. In that year the region of Michigan passed into the hands of the United States. In 1800, when Indiana Territory was created, the western part of the present lower peninsula of Michigan and most of the upper peninsula were made a part of the territory. In 1802 the remaining portions of both peninsulas were added to Indiana. In 1805, the eastern part of the upper peninsula and the lower peninsula were organized as the Territory of Michigan. Great Britain took possession of the territory by the capture of Detroit in the War of 1812, but it was retaken by Commodore Perry. Its boundaries were greatly enlarged in 1818 and 1834, as Indiana receded to more nearly its present size. Michigan adopted a State Constitution in 1835, and was admitted to the Union on January 26, 1837. In that year the Ohio boundary was definitely determined; the upper peninsula given to Michigan, and its present boundaries settled before it became a part of the Union. Although Lansing is the capital, Detroit has always been the chief city. Michigan has grown rapidly in size and importance among the states of the Union since its admission to statehood.

Michigan City, a city in Laporte County, Indiana, and the only lakeport of the State, is situated on Lake Michigan, thirty-eight miles east of Chicago. It has a good harbor and excellent transportation facilities by water and rail. The Indiana State prison is located at Michigan City. Other notable buildings include St. Anthony's Hospital, the Public Library, and the Y. M. C. A. Washington Park is a beautiful recreation ground. There are also two memorial forest preserve parks and an extensive bathing beach. The sand dunes near Michigan City attract many tourists and offer new scenes for artists.

The principal industries of the city include the manufacture of freight cars, furniture, brick, mining machinery, clothing, wire goods, heating appliances, vacuum pumps, gas ranges and refrigerators. An extensive trade is carried on in salt, lumber and iron ore. Large amounts of sand are exported. In 1930 the population was 26,735.

Michigan, Lake, the third largest of the five great fresh-water lakes of America and the only one lying entirely within the United States. It separates Illinois and Wisconsin from Michigan, its upper portion dividing Michigan into two parts. It is 228 miles long and from fifty to eighty-eight miles wide, having an area of 22,450 square miles. Lake Michigan has a maximum depth of 870 feet and a mean depth of 325 feet. Its shores are low, with several lighthouses and good harbors at Chicago, Milwaukee and Racine.

Michigan, University of, a co-educational institution of higher learning, which was founded in 1837, is situated at Ann Arbor. It constitutes a part of the public educational system of the State of Michigan. The university was opened in 1841, and was one of the first colleges in the United States to admit women as students, although it was not until 1870 that this privilege was accorded women in Michigan. It is governed by a Board of Regents, the members of which are elected by popular vote and serve a term of eight years. There are nine departments in the university: the College of Art, Literature and Science; the Colleges of Engineering and Architecture; The Medical School; the College of Dental Surgery; the Graduate School; the School of Education, and a School of Pharmacy. There also exists a University Senate which is primarily concerned with such matters of interest as are common to members of the university. Among the degrees conferred by this institution are those of Bachelor and Master of Arts, Science, Law, Architecture and Engineering; Doctor of Medicine, Philosophy, Public Health, and Dental Surgery.

The University of Michigan has many noteworthy features, including two observatories (the Detroit Observatory was founded in 1857) ; two hospitals which provide for clinical instruction and training-schools for nurses, and several unusual museums. The Stearns Collection of musical instruments is housed in one of the university museums, in addition to many other valuable collections. Social activities of the university are centered in the Michigan Union, which was organized in 1904. Alumni, students and benefactors of the University contributed generously towards the construction of the Michigan Union Building, which was completed in 1922. In 1932-33 there were 11,256 students enrolled in the colleges of the University. The faculty numbered 778.

Micmacs (*mĭk′măks*), a tribe of North American Indians, a branch of the Algonquian family, who at one time dwelt in Newfoundland and eastern Canada, occupying the whole of Nova Scotia, Cape Breton Island, and Prince Edward Island. It has been estimated that they once numbered 4,000. Throughout the colonial wars which occupied the early American settlers, the Micmacs remained faithful allies of the French. They became famous for their raids into New England.

The tribe developed a rich folklore which is so vividly portrayed in the *Legends of the Micmacs.* These Indians possessed a writing the origin of which is unknown, although it is claimed that this writing shows traces of contact with the early Norse settlers in America. To-day the majority of Micmacs are Roman Catholics who have become fishermen, guides or curio makers.

See Indians, American.

Microbes (*mī′krōbs*), microscopic organisms, are divided into bacteria, yeasts and molds. Bacteria are plants of a microscopic character, which are propagated by simple division or fission. Yeasts and molds have a different mode of growth. Bacteria assume a variety of forms; but usually approximate either the form of a rod, a spiral or a sphere. So wide is their distribution that one hundred different kinds of bacteria are estimated to occur in the human mouth. They appear to have been observed as early as the latter part of the seventeenth century by Leeuwenhoek, a Dutch scientist; but the difficulty of isolating one kind from another postponed accurate study of bacteriology until the studies of Pasteur and Koch upon fermentations and gangrenes gave a fresh impetus to this science. Pure cults of bacteria of a certain species are now skilfully isolated for observations. For instance, beef tea may be inoculated with a mixture of species, poured out upon a flat surface, and allowed to solidify in such a way that the bacteria are fixed in their separated situations. About each germ a pure colony grows up, which may be isolated before admixture of other species has taken place. Bacteria are often colored for observation under the microscope. Some are so small that more than 3,300,000,000,000 of them would only amount to the volume of a drop of water. About 40,000,000,000 area bacteria would weigh one grain. Most species of bacteria are quite harmless, and many are necessary and useful. The knowledge of the nature of disease microbes has been of the greatest importance in medicine and surgery. The process of catching a disease is no longer mysterious, many of its channels are known, and the bacteria of the disease may be combated both indirectly and directly. Infectious disease may be traced to emanations from some person sick with that disease. Microbes breed true; and the destruction of germs and sterilization of all instruments have greatly diminished fevers, plagues etc. The greatest success in bacteriology has been won against diphtheria. Almost as notable is the success of vaccination against smallpox and bubonic plague. Weakened bacteria are injected into the blood, which is henceforth fortified against the more virulent forms of the same disease.

Yeasts (*q.v.*) develop by spores, not by fission; but these also are microbes or vegetable micro-organisms.

Molds are microbes which send forth shoots at a certain stage of growth. It is these shoots which give the appearance of moldiness. Molds (*q.v.*) are serious enemies to the farming and silkworm industries.

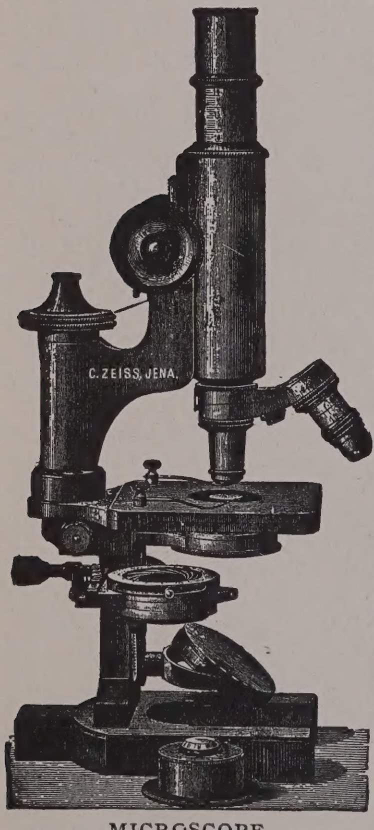
Micrometer (*mī-krŏm′ē-tĕr*), an instrument for measuring the dimensions of very small objects. The object measured is nearly always the image produced by a microscope or by a telescope. From the size of the image the angular or linear size of the object may be inferred when the focal lengths of the lenses are known. Practically all micrometers are based upon the principle of the screw. In the focal plane of the instrument is fixed one line, usually a spider-web. On a small metallic frame is mounted another spider-web. This metallic frame is the nut of a screw with a fine thread and a divided head. By moving the instrument or the object, one side of the object is made to coincide with the fixed thread and the other side of the object with the movable thread. The number of revolutions of the screw required to carry the movable thread from this position to one of coincidence with the fixed thread is the size of the object in terms of the screw. The angular distance between two stars can thus be measured with the utmost accuracy; while with a microscope objects even smaller than $\frac{1}{100,000}$ of an inch have been measured.

Microphone (*mī′krō-fōn*), an instrument in which sound-waves are employed to produce variations of electrical resistance, and hence transmit electrical effects to a considerable distance. The principle upon which the instrument rests is the fact that the electrical resistance of carbon varies with the pressure to which the carbon and its connections are subjected. One of the earliest forms of microphones was that devised by Hughes in England in 1878. It consisted essentially of a small rod of gas carbon, standing upright with its lower end on a carbon button and with its upper end held in a carbon collar. These three carbons, resting upon a resonance box, formed a part of an electric circuit, which also included a telephone. This instrument is so sensitive that the tread of a fly can be heard at a long distance. The modern telephone transmitter is essentially a microphone, in which the pulsations of the air due to the human voice alternately increase and diminish the pressure at one of the contacts in the telephone circuit. See TELEPHONE.

Micropyle (*mī′krō-pīl*) (in plants), the small opening left by the integument or integuments of an ovule, through which the pollen-tube ordinarily passes to the nucellus When the seed ripens, the micropyle is usually left as the weakest spot in the seed-coat, and through it the embryo first protrudes. See OVULE.

Mi′croscope, a magnifying instrument. The simple microscope consists of a single convex lens or set of lenses by which the object is viewed directly. The compound microscope is a combination of lenses. One set — the objective — placed near the object forms a real image, and this is further enlarged by a magnifying eyepiece placed next to the eye of the observer. The date of the invention of the microscope is uncertain. Roger Bacon in 1276 used a lens of rock crystal for magnifying objects, and he is generally regarded as the inventor of the simple microscope. The weight of evidence seems to point to Galileo as the inventor of the compound microscope in 1610. Those ascribed to the Janssens in 1590 were simple microscopes. Simple microscopes were brought into general use by Leeuwenhoek (1632–1723) and Malpighi (1628–94). The former had a collection of more than 400 lenses, magnifying from 40 to 270 diameters, and he was the father of microscopic observation. From that time to the present the microscope has been greatly in use. At first it was the newness and the wonders of the microscopic world that made the attraction, but gradually the microscope came to be used as a tool of study. In 1840 the manufacture of lenses or magnifying glasses was vastly improved, and the microscope has ever since been used in research to serious purpose. It has been the means of showing the minute structure of all tissues, the protoplasm upon which their activity depends, their condition in health and disease. It has shown the germs of disease, made analysis of the sense-organs possible, and helped greatly in the comprehension of all nature. Many brilliant and important discoveries have been reached through using it. See Bacteria, Cell-Doctrine, Development, Protoplasm.

The compound microscope consists of mechanical parts and optical parts. The mechanical parts taken together constitute the stand (see illustration). This has a base or foot, from which rises a supporting pillar carrying a stage and an arm. The stage is for holding objects to be examined; it is perforated by a round aperture, through which light is thrown from a mirror located underneath the stage. The size of the aperture is usually regulated by an iris diaphragm, and often there is a glass condenser for the light. The arm carries a tube in which the lenses are inserted. Finally there is a means of bringing the lenses into focus. This is accomplished by a coarse adjustment — usually a rack and pinion movement — to move the tube quickly into position, and a fine adjustment, for slow movements, to get an accurate focus. The latter is very important in using lenses of high magnifying power. It usually is a micrometer screw and spiral spring. A good stand should be firm, low enough to work upright in order to avoid currents in fluids, which occur when it is tilted, and have a good, fine adjustment. The lenses or optical parts are the most important parts of a microscope. Those which do the greatest amount of magnifying are attached to the tube, near the object, and are called objectives. The oculars or eyepieces fit in the tube near the eye of the observer. The degree of magnifying power depends on the lenses used. The ordinary working powers range from 75 to 500 diameters. When a higher degree of magnification is desired it is not necessary to purchase a new microscope, but simply to get a new objective. The cost of objectives of high magnifying power is considerable, and the difficulty of working with those magnifying above 600 diameters is considerable, too. Student's microscopes can be obtained from $15 upward; a good one will cost $40 and upward. There are many good makers of microscopes, but those most highly esteemed at present are made by Bausch and Lomb of this country, Leitz of Westlar and Zeiss of Jena, Germany. Microscopic technique has become an art and a science, and on it much of success in discovery depends. See Carpenter's *The Microscope and Its Revelations* and Beale's *How to Work with the Microscope*.


C. ZEISS, JENA.

MICROSCOPE

Microsporangium (*mī′krȯ-spȯ-răn′jĭ-ŭm*) (in plants), the sporangium which produces microspores. In pteridophytes they are produced by the water-ferns, selaginella and isoetes; while in all seed-plants (spermatophytes) the so-called pollen-sacs are microsporangia. See Heterospory.

Microspore (*mī′krȯ-spōr*) (in plants). In cases of heterospory (which see) the small asexual spores are called microspores. In germination a microspore produces a male gametophyte, that is, one which bears the sperms. Microspores are found in a few pteridophytes and in all spermatophytes. In the latter group the microspores are better known as pollen-grains. See Heterospory.

Microsporophyll (*mī′krȯ-spŏ′rȯ-fĭl*) (in plants), the sporophyll which bears microsporangia. They are chiefly developed in seed-plants, where they are usually called stamens. See Heterospory.

Midas (*mī′das*), one of the ancient kings of Phrygia, who are always called either Midas or Gordius. According to mythology, Midas, for a kind act, was promised by Dionysus whatever he should ask. He, believing gold to be the best possible thing, asked that everything he touched should turn to gold; but when the request was granted, he found to his sorrow that there are many things more necessary, for even his food became gold, and, in danger of starving, he begged the god to take back the gift. He was sent to wash in the Pactolus, the sands of which still yield grains of gold. He decided a contest between Pan and Apollo in favor of Pan, and Apollo in revenge gave him a pair of ass's ears, which he hid under a cap. The secret so oppressed his barber that he dug a hole in the ground and whispered into it: "King Midas has ass's ears." The reed is said to have grown from this hole, and is thought to whisper the secret whenever stirred by the breeze.

Mid'dle Ages, also called medieval, are the period between ancient and modern times in history. They are generally thought to begin in 476 with the downfall of the western empire of Rome and to end with the Reformation in the first part of the 16th century, or a little earlier, in the latter part of the 15th century, when America was discovered, printing invented and the new impulse given to learning by Greek refugees from Constantinople. The term, Dark Ages, is used to cover part of the period, and indicates the time in history (about 500 to 1100) when learning was at its lowest stage between the literature of Greece and Rome and the literatures of modern Europe.

Mid'dlebury, a town in Vermont, 33 miles southwest of Montpelier. The region is picturesque, with views of the Green Mountains and near-by Lake Dunmore, five miles long, nestled among the hills. A fine variety of marble is quarried here, and there are several manufacturing establishments. It is the site of Middlebury College, founded in 1800, and having 23 professors and 364 students. Population 2,848.

Middlesbrough (*mid'd'lz-b'rŭh*), a manufacturing town of Yorkshire, England, near the mouth of the Tees. In 1829 there was only a single farmhouse, surrounded by marshes, on the site of the town. Its growth is due to the discovery of iron-ore in the Cleveland Hills near by. One third of the great iron production of the United Kingdom is from the Cleveland mines. The industries are iron and steel works, blast-furnaces, sawmills, shipbuilding, wire, nail and tube works and large salt and soda works. It has fine public buildings and large parks. In 1899 the total tonnage entered and cleared, excluding the merely coastwise tonnage, was next to that of Swansea, being 320,000 tons. Population 91,302.

Mid'dletown, Conn., city, county-seat of Middlesex County, about 18 miles south of Hartford, on Connecticut River. Opposite is Portland, where there are valuable brownstone quarries, and the two places are connected by a long drawbridge. Middletown is in an agricultural region where dairy products, peaches and tobacco are the leading productions, and good waterpower aids in making it a manufacturing city. The chief manufacturers are pumps, typewriters, bone-goods, rubber-goods, enamel ware, silks, harness-trimmings, locks, marine hardware and silver-plated ware. Its educational institutions are a big modern high school, Wesleyan University, Berkeley Divinity School and Russel Free Library. Here also are the state's Insane Hospital and its Industrial School for Girls. The settlement was founded in 1650, and incorporated as a town the next year under the name of Mattabeseck, which was changed to Middletown two years later. It has the service of the N. Y., N. H. and H. Railroad. Population, 13,500.

Middletown, N. Y., a town in Orange County, southeastern New York, 24 miles west of Newburg and 65 northwest of New York City. It is in an agricultural and pastoral region, and is served by the Erie; New York, Ontario and Western; and New York, Susquehanna and Western railroads. Here is New York Homeopathic Hospital for the Insane. It is well-supplied with schools, churches, libraries and banks, and its industries embrace woolen-hat factories, silk and handkerchief mills and saw and file works. Population 22,000.

Middletown, Ohio, city, Butler County, on Miami River, about 34 miles north of Cincinnati It is in an agricultural region, and besides is a manufacturing city, for its waterpower aids in that direction. It manufactures agricultural implements, paper, flour and dairy and tobacco products. It has good public and parochial schools and several fine churches. It has the service of three railroads and of the Miami and Erie Canal. Population 30,000.

Mid'ianites, an Arab race, inhabiting the country between the Red Sea and the plains of Moab near the Dead Sea. Their caravans traveled from Egypt to Syria, carrying gold and incense to Palestine. Jethro, the father-in-law of Moses, either was a priest or a chief of the Midianites. They were troublesome neighbors to the Israelites until conquered by Gideon. They worshiped Baal-Peor. In the times of the Romans there were valuable mines in Midian, and petroleum is found there. The country became a Turkish possession in 1887.

Mid'rib (in plants). In case there is one central main rib in a leaf, this is spoken of as the midrib. It is found in leaves of the pinnate type of venation. See Leaf.

Mid'summer Night's Dream, A, written about 1595 by Shakespeare, is a favorite comedy to this day for the romantic and fanciful atmosphere in which it is cast and for the great humor of the minor plot, which deals with the production of a play written to please Duke Theseus on his marriage. The ranting of Bottom the weaver is a take-off upon the turgidity of contemporary tragedians, perhaps especially on that of Marlowe, the greatest of them. The festivities in connection with the marriage of Theseus, the legendary king and hero of Athens, to the Amazon Queen Hippolyta, furnish the framework for a fantastic love-story. In this story the charms administered by Puck at the order of Oberon, king of the fairies, woefully confuse the four lovers who wander in the wood; but mistakes are set right, and all is at length happily concluded. Bottom and his artisan friends give their play in unintentionally farcial manner before the amused Theseus and his bride. The music of *Midsummer Night's Dream* is by Mendelssohn and includes the favorite wedding-march.

Midsummer Night's Dream (Music). Composed by Felix Mendelssohn-Bartholdy (1809-47), at the command of the King of Prussia, at whose palace, at Potsdam, it was first produced on October 14, 1843. Aside from the overture, written in 1826, there are 12 numbers: scherzo; fairy-march; chorus, with solos for two sopranos: "You Spotted Snakes;" melodrama; intermezzo, after the second act; melodrama: "What Hempen Homespuns;" notturno after the third act; andante: wedding-march, after the fourth act; funeral march; dance of the clowns; and *finale:* chorus of the fairies.

Mignonette (*mĭn'yŭn-ĕt*), a plant cultivated for its fragrance, and a native of North Africa. The name means little darling. It has long clusters of rusty and greenish-white flowers. It is an annual, thrives in sandy soil and blooms the summer through.

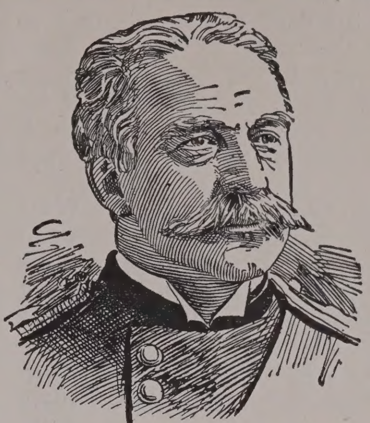
Migra'tion. Migration literally includes such permanent changes of place as the movement of the Angles and Saxons from the European continent to England or of the Huns and Turks from Asia to Europe. In the animal world such migrations have often taken place. Especially must the invasions and the retreat of ice during the glacial periods have caused extensive migration of animals, and have had important results on their characteristics. But the most common use of the term is to denote periodic migrations. These are most common among birds, but are found also in other animals. The whales change their fishing-grounds with considerable regularity to seek agreeable and abundant food. Deer, goats and sheep periodically, in some parts of the world, leave the plains for the hills, to escape the flies that torment them. The bison had periods of migration from mountains to plains, and the caribou still changes its grounds regularly between the coast of Labrador and the shores of Hudson Bay. The lemming, a rat-like animal of northern Scandinavia, multiplies with such rapidity that it overcrowds its territory. Swarms then migrate southward at fairly regular periods several years apart, and advance steadily till they meet the sea. Into this they plunge. But it is not recorded that any survive to return. Among insects migrations of locusts are well-known, but it is not certain whether there is any regularity about them. The same is true of the comparatively rare migrations of butterfly swarms across tropical seas and oceans. In the spring there have been noted fairly regular migrations of herring, mackerel and many other fishes from deep to shallow water in order that the higher temperature may hatch the spawn. Regular migrations at the spawning-season are also noted in the salmon, shad, trout and eels, which leave the sea for the fresh waters of rivers and lakes. Some turtles are said to migrate with considerable regularity. Of the 23 recognized orders of birds only two are regular migrants, but these include the birds most familiar to us. It is supposed that the habit of migration was set up at the close of the glacial period. The warmer region of the earth may be regarded as the real home of the bird, and the colder as the place selected for breeding. While most of the birds of the United States choose it for their summer quarters, others reside here only in winter, going further north in spring. Again, others are simply birds of passage, wintering south of us and spending summer in the far north. The most extraordinary migrant, perhaps, is a species of plover, which regularly changes its home from Patagonia to Labrador and Greenland, entering the United States at the mouth of the Mississippi and flying north. As to the cause of migration, while it is easy to see that birds gain many advantages by the habit, it is not so easy to understand how they learn the time to change their abode and the course of their flight. It has been suggested that a bird flying at a great height commands a range of 100 miles or more and that the older birds may guide the younger, so that the tradition of the route is preserved. But it is objected that flight often occurs at night, that many birds do not fly high, and that some fly across hundreds of miles of sea or ocean.

Mikado (*mĭ-kä'dō*), from the Japanese words for exalted and gate, is the ancient and poetic title of the Japanese emperor. The present mikado is the 121st (or 123d) mikado. See JAPAN and MUTSUHITO.

Milan (*mĭl'ạn* or *mē-län'*), a city in Italy, the second in size, ranking next to Naples. It stands in the great Lombard plain, 25 miles south of Lake Como, at the foot of the Alps. Surrounded on three sides by walls, it is entered by 14 gates. Though an old city, it has so often been ravaged by war as to have few ancient buildings. The modern city has broad, regular streets, fine buildings and attractive promenades. The cathedral, on the site of two more ancient ones, begun in 1386 was practically finished, by order of Napoleon, in 1805-13. There are 6,000 statues, in niches on the outside, and a great number of pinnacles. St. Ambrose (868), St. George (750) and St. Maria (1463), with Leonardo da Vinci's famous painting of *The Last Supper* on its wall, are other ancient churches. The palace of arts and sciences has a valuable collection of paintings by Raphael, Titian, Vandyck, Mantegna and others. The national library has nearly 200,000 volumes, with a museum and an observatory; and the Ambrosian library, 175,000 volumes and a fine collection of paintings and engravings. The city has an extensive trade in silk, cotton, grain, rice and cheese, and manufactures silks, velvets, gold, silver and iron wares, railroad cars, tobacco and porcelain. It also is a center of the printing-trade, and is the chief banking city of northern Italy. Population 584,000. Historically, it was a town of Gauls, was conquered by the Romans in 222 B. C., and became a rich and important city. In the 4th century it was the court-city of the empire. Huns, Goths, Longobards and Franks held it at different periods, until it was subjected to the Franco-German empire in 774; and several of Charlemagne's successors were crowned at Milan. In the 11th century, as the head of the Lonbard league, Frederick I twice besieged it, and once almost destroyed it. In 1395 the Visconti made Milan the capital of a duchy, which extended over the whole of Lombardy, Matteo being the first duke. From 1450 to 1535 his successors, the Sforzas, ruled the country. It passed then to Spain; from Spain to Austria; and from Austria to Napoleon, who made it the capital of Italy. It belonged again to Austria until the peace of Villafranca (1859), when it was ceded to France and yielded by France to Sardinia.

Mil'dew, the name of various plants (fungi), but chiefly applied to a large group of the ascomycetes (which see), which are external parasites growing chiefly upon the leaves of seed-plants and covering the surface like a delicate cobweb. The mildew on lilac leaves is one of the most common forms, this host-plant being very seldom free from it. Apple, cherry and pear mildews are familiar. There are two classes; true or powdery and false or downy mildews. The downy mildews belong to the phycomycetes (which see), and are destructive internal parasites. One of the commonest forms attacks grape-leaves, making its presence known by small, downy patches which come to the surface and consist of minute branches bearing spores. Dusting with sulphur is recommended for plants affected by powdery mildew; and spraying with a fungicide is used for powdery and for downy mildews.

Miles, Nelson A., an American general, was born at Westminster, Mass., Aug. 8, 1839. At the outbreak of the Civil War he entered the 22d Massachusetts volunteers as lieutenant. He distinguished himself at Fair Oaks, Fredericksburg, Chancellorsville, Malvern Hill, Spottsylvania, Richmond and many other battles. He won promotion until he became a major-general and was placed in command of a division. When the volunteer army was disbanded in September, 1866, he was commissioned colonel of the 40th United States infantry. He was made brigadier-general in 1880 and major-general in 1890. After the close of the Civil War General Miles earned fame as an Indian fighter. He conquered the hostile Sioux in Montana, and drove Sitting Bull, their leader, into Canada in 1876 after the massacre of General Custer and his force. In 1886 he compelled the Apache chiefs, Geronimo and Natchez, to surrender. In 1890, during the ghost-dance outbreak among the Sioux, General Miles forced a surrender in January, 1891, at Wounded Knee, South Dakota. On the retirement of General Schofield in 1895 General Miles succeeded him and was in command of the United States army during the Spanish-American War. He has published *Personal Recollections* and *Military Europe*. He was promoted to the rank of lieutenant-general in 1901, and retired in 1904.


GEN. NELSON A. MILES

Miletus (*mī-lē'tŭs*), an ancient city of Ionia, in Asia Minor, near the Meander. It was famous for woolen cloth, carpets and furniture, and had a large trade. Nearly 80 colonies were founded by its citizens on the Black Sea and in the Crimea. Under the elder Cyrus the city was conquered by Persia, and again, after a rebellion, was taken by Darius and nearly destroyed. Although rebuilt and sufficiently powerful to contend with Alexander, who took it by storm, it never regained its importance, and was finally ruined by the Turks.

Mil'itary Schools in the United States were projected as early as 1776, when the Continental Congress resolved to appoint a committee of five to bring in a plan for a military academy. Washington and other statesmen and generals had become convinced of the necessity of an institution for theoretical instruction in military science and art; and it was largely due to Washington that West Point Academy was founded. Its purpose is to train suitable candidates to be officers in the army. Each Congressional district and territory and the District of Columbia are entitled to send one cadet; and ten others are appointed. Candidates are subjected to a rigid physical examination. The academic courses and examination tests are very thorough; and in summer the cadets are encamped and engaged only in military exercises and in receiving military instruction. The cadets are paid $540 each *per annum*. Their uniform and all articles of their clothing are of a prescribed pattern. After graduation the cadet who has fulfilled all requirements and has received his diploma is entitled to be appointed to the post of second lieutenant in any corps in which there may be a vacancy that he is judged competent to fill. If there is no immediate vacancy, he may be appointed an additional second lieutenant.

In addition to the academy at West Point, the United States has four special or postgraduate military schools: the *Artillery School of Application* at Fort Monroe; the *Engineer School* at Willet's Point, New York Harbor; the *U. S. Infantry and Cavalry School* at Fort Leavenworth, Kansas; and the *Fort Riley School* Kansas.

It is not only the officers of the American army who are instructed; for since 1878 it has been required that schools shall be established at all posts, garrisons and permanent camps for the purpose of giving instruction in the English branches of education to all soldiers unable to pass a certain examination. It is felt that each soldier may need reading and writing in the course of his duties; and, especially, that he will be the better citizen on his return to civil life if he has been instructed in these branches.

England has two great military schools: the *Royal Military College* at Sandhurst for cadets for the cavalry and infantry and the *Royal Military Academy* at Woolwich for Royal Engineers and Royal Artillery cadets. None are allowed to compete unless their social position is approved by the commander-in-chief. The entrance and physical examinations are extremely rigid; and fees are charged. There are other English practical military schools at Chatham (for engineers), Shoeburyness (for gunners), Camberly (for advanced tactics) and Hythe (for musketry). In Germany there are ten cadet-schools, an academy at Lichterfelde, near Berlin, and 11 war-schools. In France there are 23 military schools, including both higher and preparatory schools. Japan has excellent military schools, which train some of the officers of the Chinese as well as the Japanese army.

Military drill has long been a feature of the instruction of state colleges and of colleges of agriculture and mechanical arts as also of many public and private schools, although this drill was not always compulsory and the number of students taking it in proportion to total attendance was small. During the European war, after the extension of the draft age limit to include young men of 18, a plan was adopted including military training as part of college courses. Under this plan, young men, after registering under the draft, were permitted to go to the college of their choice where, in addition to pursuing regular studies, they were given military training, uniformed, supplied with arms and other equipment and placed on full active duties as privates in the national army, subject to call. The military instruction and the cost of housing and subsistence was supplied by the Government.

The war, among other things, brought sharply to the front, as a question of vital importance to the very existence of civilization, the subject of military training. England, which had previously maintained an army no larger, relative to her needs, than that of the United States, became a great training camp. With the engagement of the United States in the conflict, the quick overturn of the tradition of voluntary enlistment and the substitution of universal service, similar training camps were established all over the country.

Mili'tia, the name applied in England and in the United States to the military reserve or purely defensive forces, in America theoretically covers all citizens of ages ranging between 18 and 45 years. In England it is organized as a national body; in the United States previous to the European War only as a state body, though liable to be called into the federal service in case of need. The militia in each state was partly organized under an adjutant-general. It was not unusual for the militia to be called out in case of riots, lynchings or similar disturbances to preserve order within the state. It was liable to be called out for war-service for a period not exceeding nine months; but only for home-defense. By the act of June 3, 1916, these state bodies were absorbed into the national army (*q. v*).

In all essentials the militia is the old English *fyrd* or body of freemen in arms.

Mil'ford, Mass., town in Worcester County on Charles River, about 17 miles southeast of Worcester. The surrounding country is agricultural, and in the vicinity are large granite-quarries, which contribute to the industrial riches of the town. The chief manufactures are shoes, straw-goods, bone-cutters, boot and shoe trees, foundry and machine shop products and rubber goods. The town has good public and parochial schools, a fine high school and a public library. It has the service of two railroads. Population, 13,600.

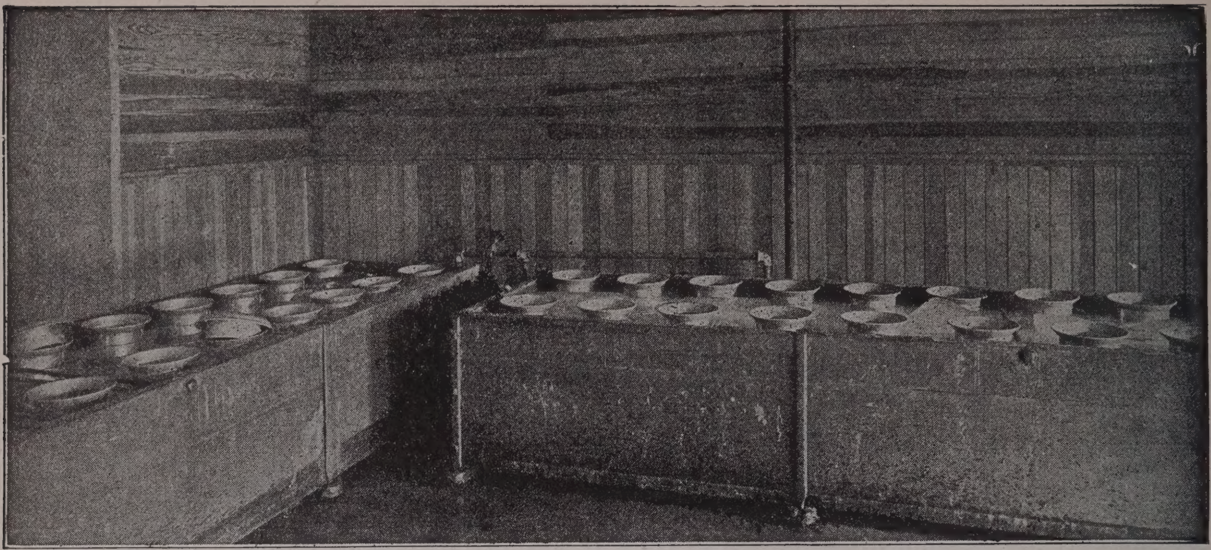
Milk, the well-known white fluid, the secretion of the mammary gland, obtained from the cow, though the milk of goats and asses has been used. It is one of our most important foods, as it contains all the elements needed for the body and is easily digested. When examined by a microscope, it is seen to consist of a large number of round substances or globules, which are transparent and very small and float in a colorless fluid. These globules are made of fat, with a thin coating somewhat like the white of an egg, called casein. When the milk stands, the larger globules rise to the top and make the cream, which is the fattest or richest part of the milk. When the cream is shaken, as in a churn, these globules break and the fat runs together, making lumps, which are called butter. The casein which surrounds the globules of fat, and is also dissolved in the liquid, if it becomes sour, either naturally by exposure to the air or by the addition of rennet or an acid of any kind, collects into masses called curd. This change is brought about partly by minute forms of animal life, called microbes, which get into the milk from the air. This is one reason why it is so necessary to purify by heat, usually hot water, all the articles used about milk. Sterilization and pasteurizing of milk are effective in removing or neutralizing the intrusion of bacteria. The clots or curds, made by the addition of rennet to the milk, are pressed into blocks and make cheese, which is a very rich food, containing all the fat of the milk, as do cream and butter, and the casein, also, which is an albuminous substance. Condensed milk is prepared by sweetening the milk and evaporating it, until it loses about half or three fourths of its bulk. It is poured into tins while hot, and sealed. When used, it is diluted with several times the quantity of water. The adulteration of milk by adding water, starch or chalk is frequent in large cities, and has called for boards of inspectors and produced instruments, known as lactometers, for detecting it. The most common fraud, however, in the sale of milk is removing the cream. Supplying a large city with cream and milk creates a great business and employs many men: those who milk the cows at all hours; the railroad employees who run the great milk-trains; the large dealers who distribute it to the wagons; and the drivers of the milk-carts whose noisy clatter disturbs the early-morning nap, but whose faithful labors in heat and cold furnish our milk and cream for breakfast. A quart of milk at eight cents is as nourishing as a pound of beefsteak at 18 cents; while a pound of American cheese, costing 20 cents, authorities affirm, contains almost as much nourishment as two pounds of the best beefsteak.

Milk'weed, species of *Asclepias*, a genus of the milkweed family, which contains about 85 species, mostly natives of the western hemisphere, nearly 50 occurring in North America. The name comes from the fact that they contain a milky juice which exudes from wounds. They also are often called silkweeds from the large pods containing numerous seeds bearing beautiful tufts of silky hair. These seeds with their downy sails are of much interest. One of the most attractive forms is the butterfly-weed or pleurisy-root (*A. tuberosa*), whose flowers are bright orange and in midsummer clothe the dry pastures of New England in masses of brilliant color. The stem is from one to two feet high, but contains little "milk." The other forms are taller and have chiefly purplish to red flowers, occasionally white. The flowers are much modified for insect-pollination, the pollen-grains clinging together in masses which are carried off by the insects bodily. Probably the commonest known milkweed is *A. cornuti*, also known as *A. syriaca*. The weed has a stout, tall stem and opposite leaves, six to eight inches long. In early summer it puts forth flowers of purplish pink, blooming from June to August. The two pods are full to bursting of seeds with lovely, silky tufts.

Milky Way, a band of faint light which stretches across the sky from horizon to horizon. The light is produced by a multitude of stars so distant or so small that they can be distinguished only by the telescope. It is brighter in the southern than in the northern sky. In one part of its course it divides into two branches. Most of the stars in the Milky Way are of less than eighth magnitude. Among them are many star-clusters, but very few nebulæ. In the constellation of Hercules is a most striking star-cluster, estimated to have between one and two thousand stars. The Milky Way was regarded in ancient times as the pathway of the gods, strewn with golden sands. The Indians speak of it as the Milkmaid's Path. Very frequently it is called the Galaxy, Greek for Milky Way. Herschel, a profound student of this subject, suggested that the galaxy is a natural plane of reference for the stellar universe, just as the ecliptic is a natural plane of reference for the solar system.

Mill, John Stuart, son of James Mill, who also was known as a writer and utilitarian philosopher, was born at London, May 20, 1806. His early education was carried on by his father, beginning with the study of Greek when three years old and making him at 14 as advanced as most young men at the end of their period of study. His first writings appeared in a newspaper in 1822. Before he was 20 he was recognized as a leader in philosophy and politics, and was the most frequent contributor to the *Westminster Review* — a magazine which represented the ideas of his party. He somewhat changed his philosophical theories later, under the influence of Maurice, Sterling and Coleridge. His most important works are his *System of Logic*, *Principles of Political Economy*, *Comte and Positivism*, *Representative Government*, *Dissertations and Discussions*, *England and Ireland* and *Liberty*. He died at Avignon, France, May 8, 1873. See his *Autobiography*, which appeared in the year of his death; and *Life* by Bain; and *Life and Works* by Herbert Spencer, by Thornton, by Fox Bourne and by others.

Millais (*mĭl-lā'*), **Sir John Everett,** an English painter, was born at Southampton, June 8, 1829. His *Pizarro Seizing the Inca* was shown at the Royal Academy when only 17 and was considered equal to the best his-



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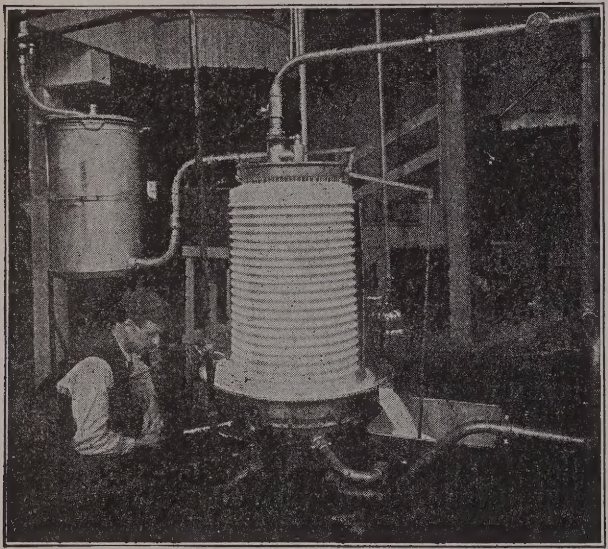
The cans of milk are put into cooling tanks and left uncovered, in order to let the animal heat escape. If it was covered before cooling, it would sour. After it is cooled it is sent to the creamery for Pasteurizing and bottling.



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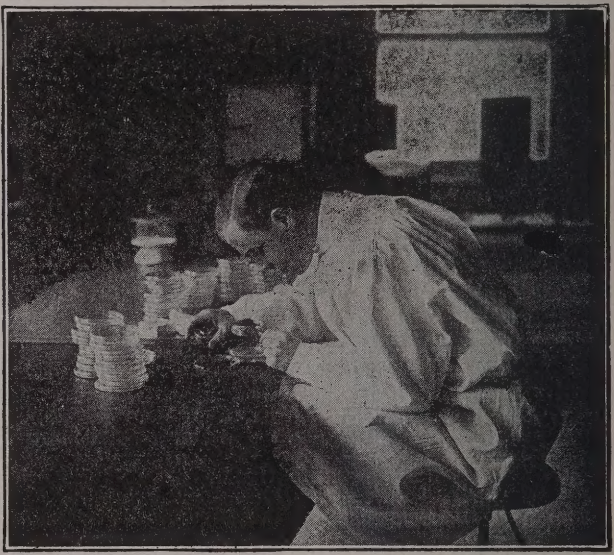
FILTER AND PASTEURIZER. The milk is next carried to a Pasteurizer. First it passes through the filter, which is the upper can on the left of the picture. It then passes to the Pasteurizer, which you see in the center of the picture. It is first warmed by being allowed to run down over the outside of the Pasteurizer, and it is then forced up through the interior, which contains a steam coil, where it is heated to 162° Fahr. This kills the germs and makes it possible to keep the milk sweet for a week. It is then carried through a pipe at the top of the Pasteurizer to the cooler.



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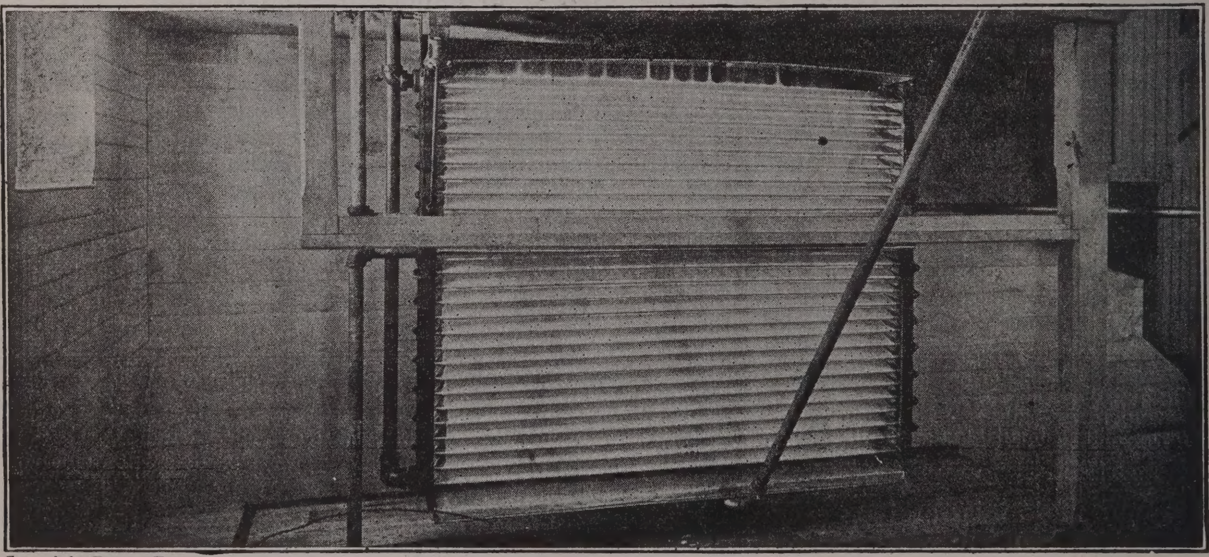
Here we see a bacteriologist examining the milk. This is done in most modern dairies, to detect any unhealthy germs.



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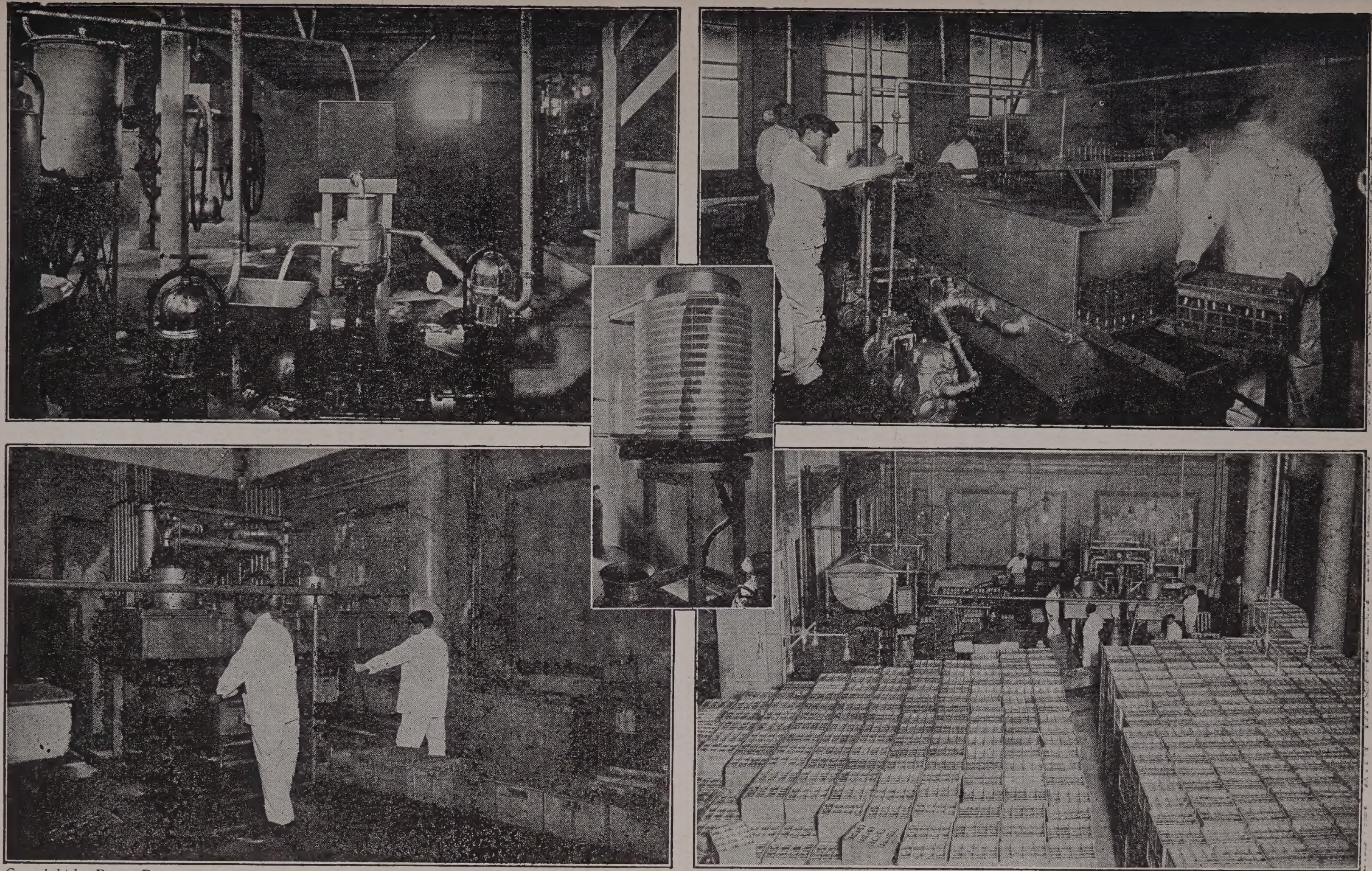
From the Pasteurizer it is forced by a pump to the cooler, where it is cooled from 162° Fahr. to 42° Fahr. This is done by letting the milk flow over the corrugated surface of this cooler, which is filled with cold water. The upper half of the cooler contains merely cold water, while the lower half is ice cold brine. This prevents a too sudden change.



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From the Pasteurizer the milk is run to the separator, shown in the upper left-hand corner. In this machine, by centrifugal or whirling force, the cream is separated from the milk. The separator is the machine in the center of the picture. Skimmed milk comes out through the spout of the tube at the left and is forced by the pump seen at the left up into a tank in the receiving room. The cream comes out through the spout at the right and is pumped through the pipe at the right to the cream cooler.

The cream cooler we see in the center of the picture. The cream flows on the outside of the cooler in which is ice cold brine. Thence it flows into cans which are carried to the bottling department, or if butter is wanted, to the churning department.

In the upper right-hand corner is a machine for steaming bottles. The bottles are thus thoroughly cleaned and sterilized and are ready for filling. In the lower left-hand corner we see men filling bottles by machinery. In the lower right-hand corner is the packing room. In the background is the bottling machine where men are filling bottles, and in the foreground are boxes filled with bottles, ready for shipment.

torical paintings then exhibited. He became connected with Rossetti and Hunt and was much influenced by them, as also by the writings of Ruskin on art. Pictures of this period are *Christ in the House of His Parents*, called *The Carpenter's Shop*, *The Woodman's Daughter* and *The Huguenot.* After his election in 1856 to the Royal Academy he exhibited *Autumn Leaves;* later he finished the *Vale of Rest*, *The Minuet* and *Rosalind and Celia.* His later works show another change in his ideas of art, and in their brilliant coloring and high finish are almost unrivaled in modern work. The *Boyhood of Raleigh*, *The Gambler's Wife*, *The Proscribed Royalist*, *Yeoman of the Guard*, *Yes or No*, *The Order of Release*, *The Black Brunswicker* and *Effie Deans* are among his later paintings. He died at London, Aug. 13, 1896.

Miller, Cincinnatus Heine, an American poet whose pen-name is Joaquin Miller, was born in Indiana in 1841. His early life was spent in Oregon and California and among the Indians. He wrote verses in these early days, though with little knowledge even of the rules of grammar. He studied law, and began practice in Oregon, where he wrote *Songs of the Sierras*, published first in London. He has since written *Songs of the Sunland*, *Ships in the Desert*, *Songs of the Mexican Suns*, *Songs of Italy* and *Building of the City Beautiful.* He is a well-known contributor to newspapers and periodicals. Since 1887 he has made his home in Oakland, California.

Miller, Harriett Mann, was born at Auburn, N. Y., on June 25, 1831, and was educated in private schools. In 1854 she married Watts Todd Miller. Olive Thorne Miller is her pen-name. She has gained a wide reputation as a lecturer on the life of birds, but is best known as the author of *Little Folks in Feathers and Fur.*

Miller, Hugh, a Scotch geologist and writer, was born at Cromarty, on Oct. 10, 1802. His education was gained mostly by reading in the intervals of his work as a stonemason. In 1829 his *Poems written in the Leisure Hours of a Journeyman Mason* appeared, and in 1835 *Scenes and Legends of the North of Scotland.* His famous *Letter to Lord Brougham*, in the church-disputes in Scotland, brought him into notice, and he was invited to Edinburgh to edit *The Witness*, a Liberal and Presbyterian newspaper. A series of geological articles in this paper, when published in book-form, was called *The Old Red Sandstone*, and contained an account of his discovery of fossils where they had never been thought to exist. His work brought him the notice of Murchison and other great geologists, Agassiz saying "he would give his left hand to possess such powers of description." He contributed at least 1,000 articles to *The Witness*, and also contributed to *Chambers' Journal.* He also wrote *Footsteps of the Creator My Schools and Schoolmasters*, *Testimony of the Rocks* and *Cruise of the Betsey.* He was one of the first writers to make geology popular, and his books are very readable to those not particularly interested in that science. He died at Portobello, near Edinburgh, Dec. 24, 1856, having shot himself in a moment of aberration. See his *Life and Letters* by Peter Bayne.

Millet, a name applied to several grasses of prime importance, because extensively used for fodder, the grain being highly valued for fowls and cage-birds. In certain countries it even is an important food for man. It is of ancient and general cultivation. The original millet or broom-corn millet of Europe is *Panicum miliaceum.* In the United States the common millets are forms of *Setaria italica* known as the fox-tail millets; while the well-known millet-grass is *Milium effusum.* To the common brown millet (*P. crus-galli*) the name of Japanese millet is sometimes given.

Millet (*mē′lȧ*), **Jean Francois,** a French painter, was born in Gruchy, Oct. 4, 1814. The son of a farmer, he at first worked as a farm-laborer, but his taste for painting was so evident that he was sent to study with Monchel in Cherbourg. His master induced the town-authorities to grant his pupil an annuity to help him in his studies. He went afterwards to Paris and studied with Delaroche. He painted small pictures, portraits and even signboards in his first efforts to support himself. After the revolution of 1848, through which he had struggled, practicing his art and fighting at the barricades, he settled in Barbizon, near the forest of Fontainebleau. Here he lived much like the peasants and began his work of painting the peasant-life of France. *The Sower*, *Peasants Grafting*, *The Gleaners*, *Waiting*, *The Angelus*, *The Man with the Hoe*, *Wool-Carding* and *Shepherdess and Flock* are some of his best-known works. His most celebrated picture, *The Angelus*, sold for over $100,000. It was exhibited for a year in the United States. He died at Barbizon, which under his influence had become an artist colony, Jan. 20, 1875. See *The Barbizon School* by Millet.

Mills, David, born in Kent County (Ontario) in 1831. Represented Bothwell in the House of Commons from 1867 to 1882 and from 1883 to 1896. Was called to Senate of Canada, Nov. 13, 1896. He was retained by the Ontario government to defend the northwestern boundary of Ontario, 1872, and was counsel on this subject for Ontario government before the judicial committee of the imperial privy council, 1884. He was elected a member of the council of public instruction of Ontario, 1875, and on establishment of faculty of law by the University of Toronto he was chosen to fill the chair of constitutional and international law, 1888. He entered the Laurier administration as minister of justice and attorney-general of Canada, Nov. 12, 1897, and became government leader in the Senate. He was the author of *The English in Africa* and several brochures on international and political subjects. He is an acknowledged authority on constitutional law and the practice of Parliament.

Mills, James, born in the County of Simcoe, Ontario, in 1840. Graduated from Victoria College in 1868, and taught in Cobourg Collegiate Institute for three years. He became principal of the high school at Brantford, and for ten years was in charge of the farmers' institutes which he organized. He organized and superintended the traveling dairies of the province, and published *First Principles of Agriculture.* He became president of Ontario Agricultural College and Experimental Farm at Guelph in 1879, and successfully performed its duties until 1904. He resigned in 1904 to become a member of the railway commission. This position he now holds. Dr. Mills more than anyone else has contributed to the phenomenal success of the college at Guelph.

Mill'ville, N. J., a town in Cumberland County, on Maurice River, connected by electric railway with Bridgeton, is in southern New Jersey, 40 miles southeast of Philadelphia It is served by the West Jersey Railroad. North of the city are an extensive public park and a fine sheet of water. Millville possesses churches, schools, a fine high school, two libraries and banks, and has cotton mills, iron and glass factories, dye works, bleacheries and machine shops. Population 17,000.

Mil'man, Henry Hart, English divine, historian and poet and dean of St. Paul's, London, was born at London, Feb. 10, 1791, and died near Ascot, Sept. 24, 1868. He was educated at Eton and Oxford, and in 1812 won the Newdigate prize with a poem on *The Apollo Belvedere.* Early in his career he published poems of much merit, several being in Latin, and in 1821 was elected professor of poetry at Oxford. His published writings, besides his verse, embrace a *History of Christianity*, a *History of Latin Christianity*, a *History of the Jews*, *Lives of Horace* and of *Edward Gibbon* and the *Bampton Lectures* etc. He successively was canon of Westminster, rector of St. Margaret's, London, and finally dean of St. Paul's.

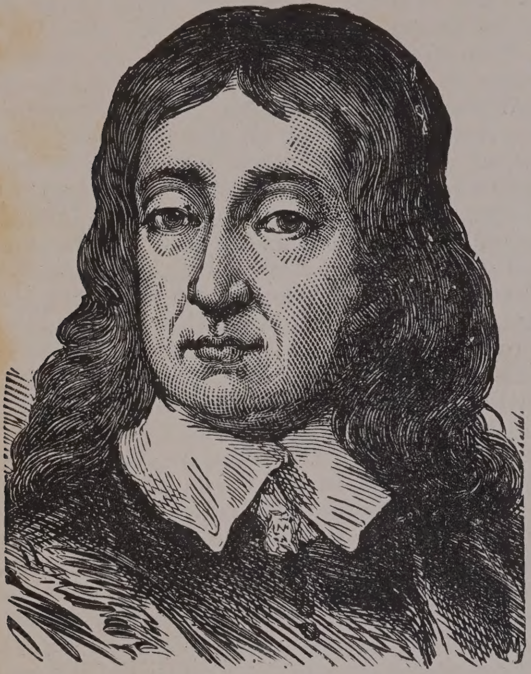
Mil'ner, Alfred, Viscount (1854–1925) British high commissioner for South Africa from 1897 to 1905 during the turbulent period of the Boer War and the reconstruction years which followed. He was the son of an English doctor, was educated at English and German universities, and became under secretary for finance in Egypt in 1892. His retirement from politics following his South African work in 1905 was interrupted in 1916 when he entered the British War Cabinet without portfolio, became secretary of state for war in 1917 and secretary of state for colonies in 1918. He was largely responsible in securing unity of Allied command under General Foch, and for inviting the various dominion premiers to the imperial war councils. He was at the head of the Milner mission to Egypt in 1920 which negotiated conditions under which the African colony should operate as an independent country.

Milner's *England in Egypt* is an important book presenting the relation of the two countries up to 1892. *Questions of the Hour* appeared in 1923.

Milo (*mī'lō*), a Grecian athlete, born in the latter part of the 6th century, was celebrated for his enormous strength. Six times he was a victor in wrestling in the Olympic games and as often in the Pythian. He is said to have carried a live ox on his shoulder four times around the race-course of the Olympic games and then to have eaten the whole animal in one day. When Pythagoras and his scholars found the house in which they were gathered falling, Milo held it up on his shoulders while they escaped. But in his old age his strength proved his ruin, for in trying to split open a tree with his hands he was caught and held fast until devoured by wolves.

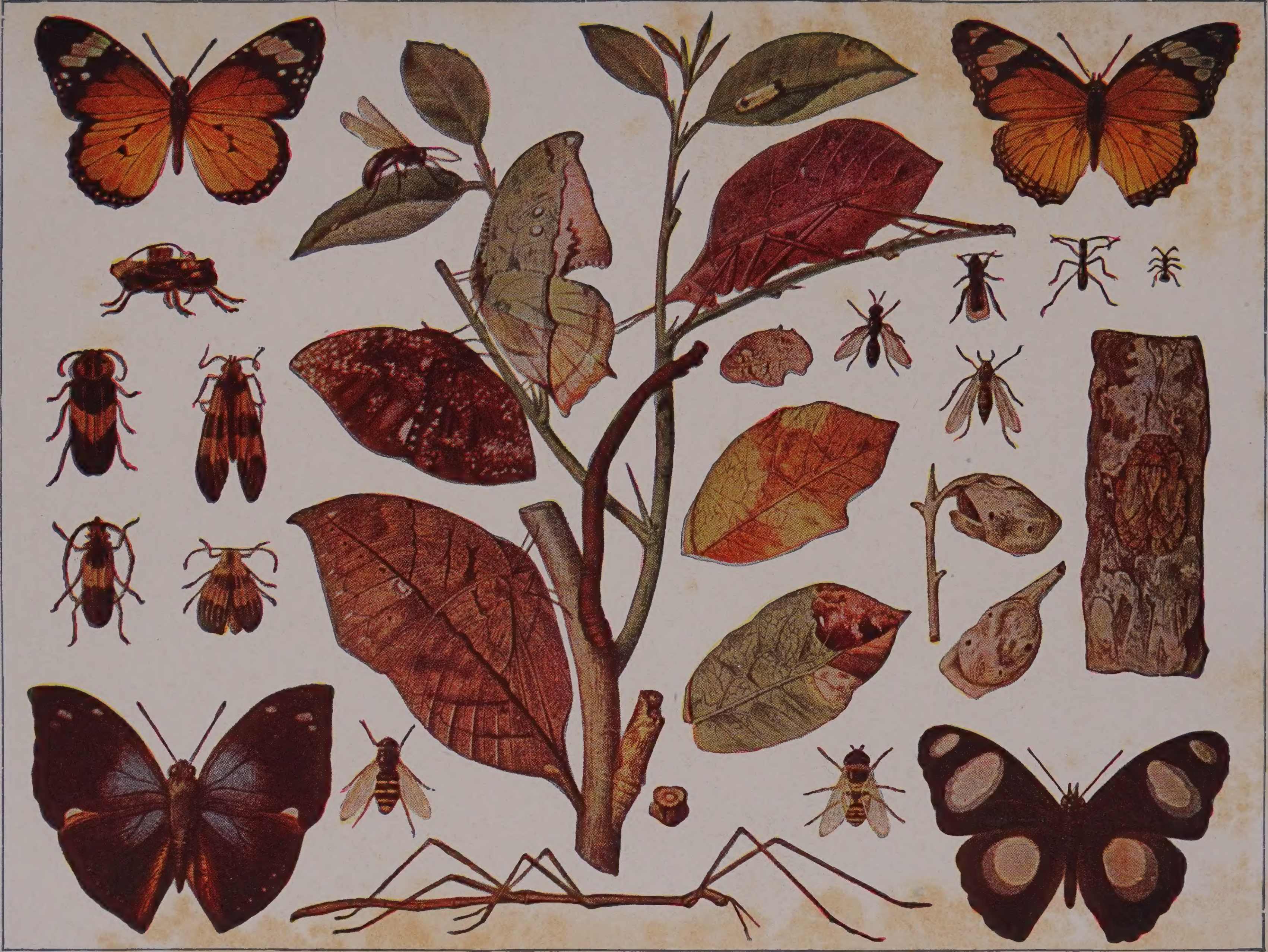
Miltiades (*mĭl-tī'ȧ-dēz*), an Athenian general, who lived in the early part of the 5th century B. C. He was ruler in Chersonesus and took part against the Scythians, and was one of the ten generals chosen to resist the Persian invasion of Attica. When the generals were hesitating whether to risk a battle immediately or defend their country behind the city-walls, through his influence the vote was in favor of a battle at once When his turn came to command, he engaged the enemy and won the famous battle of Marathon. He was given command of a fleet of 70 vessels and made an attack on the island of Paros, but failed in the attempt. He was condemned to pay a heavy fine and was thrown into prison because unable to pay. He died in prison (about 489 B. C.) of a wound he had received at Paros.

Mil'ton, John, one of the greatest of English poets, ranking next to Shakespeare, was born at Cheapside, London, Dec. 9, 1608. He studied under private tutors and at Christ's College, Cambridge. When he had finished his studies, he was prevented from entering the church, the only profession he desired, by its disturbed condition at the time. He settled at home to study with the distinct purpose of making himself a poet. He had already written *Hymn to the Nativity* and some Latin verse. At this period he wrote only four poems, *Comus*, *Lycidas* (in memory of a friend), *L'Allegro* and *Il Penseroso* In 1638 he visited Italy, and received much attention from its poets and literary men He hastened back to England at the news of hostilities between Charles I and Scotland, and the poet long gave way to the statesman. His prose-works consist largely of pamphlets, which appeared on subjects which were in dispute either in church or state. His famous *Areopagitica*, written in favor of free speech, was called forth by a threat of prosecution for publishing his tracts on *Divorce*. These had been written in 1643, when his wife, after a few weeks of married life, had gone home and refused to return to him. There is much evidence that the pair were little suited to each other and that the austere life of the Puritan home proved very cheerless to the young girl brought up in gay royalist circles. She returned to him in 1645. Cromwell rewarded Milton for his political papers with the office of secretary of foreign tongues, where his duty was to carry on the foreign correspondence of the government in Latin, the language used by the Commonwealth. He was better fitted for the position than anyone in England, and held it until the restoration of the monarchy. He lived in concealment after the accession of Charles II, until placed in safety by the act of indemnity. His eyesight failed entirely in 1654, and all his later work was written by another hand, usually one of his three daughters, who also spent many hours in reading to him in Latin and Greek, neither of which languages they understood. After more than 20 years of silence as a poet, Milton sent forth his great *Paradise Lost*, finished in 1663 and published in 1667. He received $25 for the copyright, with a promise of the same amount with the sale of the first 1,300 copies of each edition. He received the second and third payments, and in 1681 his widow yielded her rights in the book for $40. Thirteen hundred copies were sold in 20 months, which, considering the age and the lack of reviews and other modern means of making a book known, gives some idea of Milton's rank as a poet among his own people. *Paradise Regained* was written at the suggestion of a Quaker friend, who intimated that Satan is the main hero of *Paradise Lost*. *Samson Agonistes* is the poem of his old age. His home-life seems never to have been peaceful until his third marriage, when his daughters left his home, but his last years were passed in cheerful retirement, solaced with music and friends. He died in London, Nov. 8, 1674, already acknowledged to be the first poet of his age and country. See *Life* by Masson; Johnson's *Lives of the Poets;* Trent's *John Milton;* and *Life* by Mark Pattison, in the English Men of Letters Series.


JOHN MILTON

Mil-wau'kee, Wis. Before this great city of the United States was founded by the white man, it was an important Indian village. Eighty-five miles north of Chicago, on the western shore of Lake Michigan, a meeting of river and lake had made a beautiful bay seven miles wide. There the Indians met. There Father Marquette, famed missionary, probably visited in 1674. Other missionaries followed. A British lieutenant came to the settlement in 1762, and in 1779 a British regiment landed there, seeking to incite the Indians against the Americans in the Revolutionary War. Solomon Juneau, a French Canadian, and the real founder of the city, came in 1818. The early name, Manahwauksepe (gathering place by the river), became Milwaukee. The settlement enjoyed a substantial growth, which was considerably increased by German immigration in the middle nineteenth century.

To-day Milwaukee is a city of over half a million inhabitants, and is a principal port and manufacturing center on the Great Lakes. Much of the grain of the mid-west is carried by rail to Milwaukee, and shipped on the large lake boats. In number of vessels entering and leaving, Milwaukee ranks second of the Great Lakes ports. It is the largest oat, and the second largest corn market (primary) in the United States. The value of its manufactured products is over one billion dollars yearly. The ranking industries are: metal trades, food, leather, textile, chemical and drug, and wood products. The city is one of the world leaders in the manufacture of machinery, enameled goods (utensils, stoves, etc.), trucks, leather goods, engines, turbines, and saw-mill machinery. It is one of the national leaders in the manufacture of gas engines, air brakes, steam shovels and dredges, automobile parts, silk hosiery, cement, and toilet soaps. It is the second largest steel center in the United States. The excellent public schools are augmented by parochial schools, private academies, the Milwaukee State Normal School, the School of Engineering, and Marquette University, as well as the Milwaukee-Downer College for women and the Musical Society. The



PROTECTIVE MIMICRY AMONG INSECTS

public library, museum, auditorium, and numerous hospitals, sanitariums, churches, and clubs offer a social, intellectual, aesthetic and religious environment. Many trains, interurban and bus lines run from Milwaukee to numerous resorts and lakes of eastern and central Wisconsin. Between Madison, and Milwaukee there are over a hundred beautiful lakes from Lake Winnebago on the north to Lake Geneva on the south. This territory is one of the foremost summer playgrounds. The death rate of the city is very low, 9.61 per thousand; the birth rate is about 22 per thousand. Much of the city is built on bluffs which are beautifully terraced; many parks and an excellent system of connected boulevards add to the attractiveness.

Mim'icry, the imitative resemblance of one animal to another or to some inanimate object for which it may be mistaken. This is also called protective resemblance, inasmuch as animals escape notice through this form of imitation and are protected from their enemies. A wide range of cases occurs in nature. Certain insects resemble leaves, others twigs and knots. Animals of the desert have a color merging into their surroundings; many animals, like lizards, adapt their colors to their surroundings and so escape observation. Color resemblance is also carried further. Certain butterflies and caterpillars are not eaten by birds on account of their unpleasant taste. The birds learn to distinguish them by their bright "warning" colors and to leave them alone. Others forms, without noxious taste, imitate these colors and escape. A harmless animal sometimes imitates a stinging or poisonous one and is shunned. The animals protected in these various ways are, as a rule, unconscious of their imitation. Protective mimicry may be an important factor in the preservation of species. See Poulton's *The Colors of Animals.*

Mindanao (*mēn'dȧ-nä'ō*), the most southeastern of the Philippine Islands, next in size to Luzon, containing, it is estimated, 37,000 square miles. The population of that portion under Spanish domination was given by the last census made under the Spaniards as a little over 200,000. The population now ascertained is 499,634, of whom nearly 253,000 are uncivilized. The surface is broken into high mountains, reaching in the case of Apo, a volcano near Davao Gulf, an altitude of over 10,000 feet. The wet and the dry season shift from one side of the island to the other according to the direction of the prevailing winds. The island is densely wooded with timber of great value, and the tropical fauna is varied and abundant. The inhabitants are greatly divided in origin, temperament and religion. The interior is held by wild tribes of Malayan race or by the small, black Negritos with whom they have intermarried. The Jesuits, who knew most about the island before the American occupancy, divided the people into 24 distinct tribes, of whom 17 were pagan, six Mohammedan (Moro) and the remainder Christian Visayans, who came from the north. The warlike Moros are most dreaded, and, living along the frequented coasts, have held command of all important points. The rivers are larger and longer than those of Luzon, the Butan practically traversing the whole island from south to north. The soil is wonderfully productive. Gold is believed to exist in the mountains. The capital is Zamboanga, a large, clean city, with a pier extending into moderately deep water. This island was the first of the group to be discovered by Magellan in 1521.

Mindoro (*mēn-dō'rō*), one of the Philippine Islands, containing, it is estimated, about 4,050 square miles. It lies directly south of Manila Bay, having for its capital Calapan, 120 miles from Manila. It formerly was inhabited by the Tagalogs, but various expeditions of the Moros greatly reduced the native population. Others died from cholera and fever some years ago, when an epidemic among their herds carried off all their buffaloes and rendered cultivation of the soil impossible. The once rich rice-fields have for the most part gone back to tropical wilderness. In the interior are mountains rising 8,000 feet. The native races in these mountain fastnesses are greatly distrusted by those nearer the coasts. The population is supposed to be in the neighborhood of 28,000; but dread of the Sulus has kept the native races so far from the sea that but little is really known about them.

Min'eral Oil. See PETRO'LEUM.

Min'eral''ogy, the science which treats of minerals, does not embrace all that relates to the mineral kingdom. Simple minerals alone are regarded as the subjects of mineralogy; rocks, formed by the aggregation of simple minerals. and their relations to each other are the subjects of petrology (the science of rocks) and geology. Mineralogy considers the composition, structure, formation and classification of minerals. *Physical Mineralogy* embraces the outside form (generally shown by crystallization) of minerals and the other physical characteristics of each of the different species, as specific gravity (relative weight), luster, hardness, fusibility, optical properties and color. The latter usually is variable, and hence not characteristic of a mineral. *Chemical Mineralogy* considers the character of minerals as chemical compounds, embracing also methods of using chemical tests as an aid in this determination. *Descriptive Mineralogy* shows the classification of minerals and a description of the various species and their varieties as found in nature.

Although the ancients recognized many of the gems and the minerals containing the useful metals, their knowledge of mineralogy was crude. Not until the development of modern chemistry, about the beginning of the 19th century, did minerals begin to be properly studied and classified. In 1820 Mohr of Vienna presented a system of grouping minerals upon their similarity of form, taste, luster, gravity, streak and hardness. In the methods now in use in this country the system of Mohr is largely followed, with additional aid from blowpipe examination and simple chemical tests. When new species are being described, the chemical analysis and the determination of the crystalline form must be absolutely complete. A mineral species always has a definite chemical composition which varies only within certain limits, and, if it crystallize at all as most minerals do, it always has the same general form. When a substance crystallizes in two distinct forms in nature, these are looked upon as different minerals and are given separate names.

Minerals vary greatly in hardness, from soft substances that may be scratched with the finger-nails, like gypsum, to the hardest stones, as the sapphire and diamond. The same wide difference exists as to their color, even in the same species, as for example, in tourmaline, which exhibits different shades of brown, blue, green, red and sometimes is colorless, and frequently black and opaque.

The study of minerals has led to the development of the science of *crystallography*, but most chemical compounds (see CHEMISTRY) that are prepared artificially are capable also of forming crystals, and crystallography is applied to them as well as to the natural substances.

All the minerals that crystallize, as well as all artificial crystals, may be arranged in six groups or systems, according to the relation of the faces to certain imaginary lines passing through them, termed axes.

The Isometric system has three axes, all at right angles to each other, and of equal lengths. A familiar example is fluorspar, which usually occurs in cubes.

The Tetragonal system has three axes at right angles, but one of them may be of varying lengths as compared with the other two. Zircon crystallizes after this form.

The Orthorhombic system has three axes at right angles, but all unequal. Stibnite or antimony sulphide belongs to this system.

The Monoclinic system has three unequal axes, two at right angles and one oblique. The common hornblende illustrates this form.

In the Triclinic system all the axes are of unequal lengths and at varying angles with each other. A number of the feldspars are classed here.

The Hexagonal system has three axes at angles of 60° with each other, and a fourth at right angles to the plane of the other three. Beryl is a familiar example of this system.

While each mineral species that is crystallized follows its own form of crystallization, there are numerous modifications of the planes and angles of all the systems, giving rise to many complex forms. The molecular arrangement of minerals, which results in their crystalline form, also influences their capacity for transmitting light and heat. The form of the crystals in various minerals is often complicated also by what is termed twinning, when one or more parts in a crystal are in a reversed position to the other parts. This gives rise to many beautiful and complex forms. The dendritic form of magnetite between two flakes of mica is an instance of such twinning.

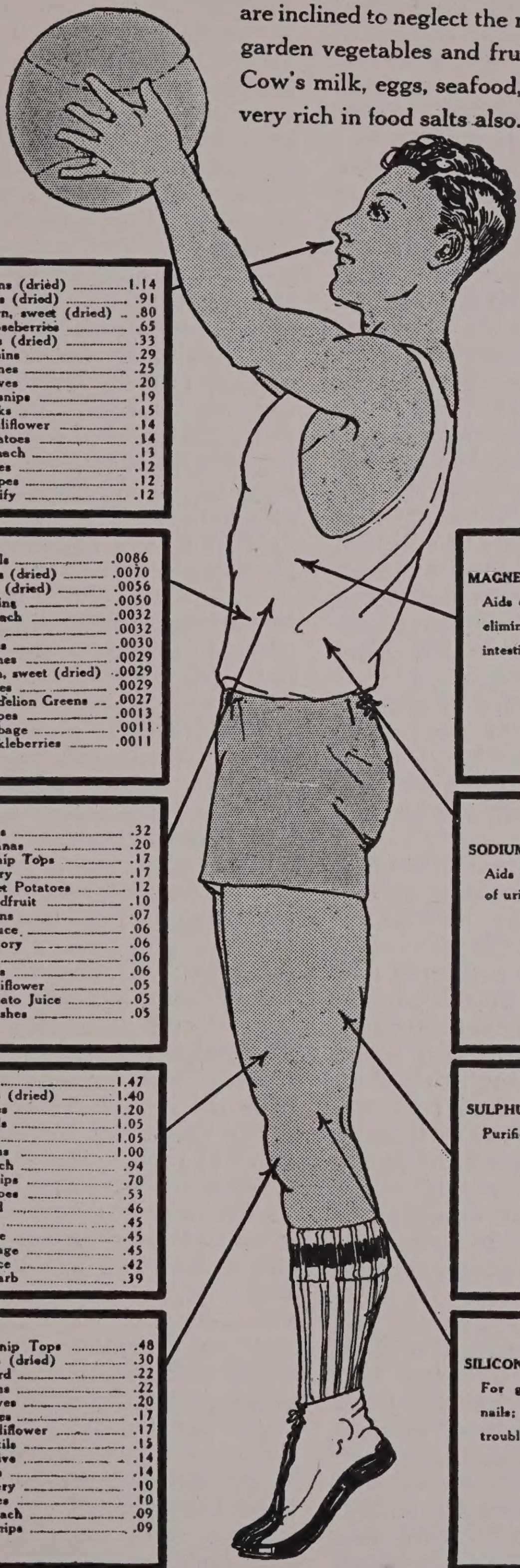
Minerals have been formed in these principal ways: (1) by the solidification by cooling of molten masses, as, for example, the quartz, feldspar and mica of granite; (2) by the action of heat upon rocks below the point of fusion, as in the formation of garnets in mica-schists, (3) by the action of water dissolving substances in one place and depositing the same or other compounds in another place, as in the deposition of calcite in veins; and (4) by the action of volcanic gases, which, upon cooling or coming in contact with substances with which they act chemically, deposit certain minerals. It is not always easy to decide in what way a given mineral has been formed, and it is evident that certain minerals may be deposited in more than one way.

An interesting and peculiar condition of some mineral species is what is known as pseudomorphism, where one mineral is replaced by another which usually retains the form of the original crystal. This arises from the substitution of one mineral for another, as for instance, smithsonite after calcite. Here the calcite crystals seem to have been gradually dissolved, while the smithsonite replaced them. Petrified wood, which is common in many places, occurring in Arizona in the shape of whole forests of silicified tree-trunks, is an example of pseudomorphism. Here the action has evidently been from the infiltration of water charged with silicic acid through the beds in which the forests were burned. As the original wood decayed or was dissolved, the silica, in the form of rough opal, took its place.

Dana's *Treatise on Mineralogy*, as revised to the present time, may be considered to be the standard for descriptive mineralogy. Brush and Penfield's *Blowpipe Analysis* is the most elaborate work on determinative mineralogy. Mineralogy in the United States, as bearing upon ornamental and precious stones, has been lately dwelt upon in detail in *Gems and Precious Stones of North America* by George F. Kunz. H. L. WELLS.

MINERAL · FOODS · IN · OUR · BODIES

Many of the minerals are necessary for our health. The foods listed below are selected for high percentage of mineral content. Of course, the body needs more than minerals, but as a rule people are inclined to neglect the minerals. Notice how vital the garden vegetables and fruits are to our physical health. Cow's milk, eggs, seafood, and cottage cheese are found very rich in food salts also.



PHOSPHORUS:

Vitality.

Develops the nervous system, for the five senses of sight, sound, feel, touch, and taste.

Beans (dried)	1.14
Peas (dried)	.91
Corn, sweet (dried)	.80
Gooseberries	.65
Figs (dried)	.33
Raisins	.29
Prunes	.25
Chives	.20
Parsnips	.19
Leeks	.15
Cauliflower	.14
Potatoes	.14
Spinach	.13
Dates	.12
Grapes	.12
Salsify	.12

IRON:

For red blood, vitality, complexion. Assists oxidation.

Lentils	.0086
Beans (dried)	.0070
Peas (dried)	.0056
Raisins	.0050
Spinach	.0032
Figs	.0032
Dates	.0030
Prunes	.0029
Corn, sweet (dried)	.0029
Olives	.0029
Dandelion Greens	.0027
Grapes	.0013
Cabbage	.0011
Huckleberries	.0011

CHLORINE:

Assists digestion of food in stomach. Prevents dyspepsia.

Dates	.32
Bananas	.20
Turnip Tops	.17
Celery	.17
Sweet Potatoes	12
Breadfruit	.10
Raisins	.07
Lettuce	.06
Chicory	.06
Figs	.06
Dates	.06
Cauliflower	.05
Tomato Juice	.05
Radishes	.05

POTASSIUM:

Develops muscles, nerves, bones, preventing diseases of these parts.

Figs	1.47
Beans (dried)	1.40
Prunes	1.20
Lentils	1.05
Peas	1.05
Raisins	1.00
Spinach	.94
Parsnips	.70
Potatoes	.53
Chard	.46
Beets	.45
Endive	.45
Cabbage	.45
Lettuce	.42
Rhubarb	.39

CALCIUM:

Develops bones, nerves, muscles.

Turnip Tops	.48
Figs (dried)	.30
Chard	.22
Beans	.22
Chives	.20
Olives	.17
Cauliflower	.17
Lentils	.15
Endive	.14
Peas	.14
Celery	.10
Dates	.10
Spinach	.09
Turnips	.09

MAGNESIUM:

Aids digestion and elimination from intestines.

Beans (dried)	.25
Peas (dried)	.24
Corn, sweet (dried)	.20
Lentils	.17
Raisins	.15
Figs	.14
Dates	.13
Chard	.11
Prunes	.08
Spinach	.08
Parsnips	.07
Chives	.05
Turnip Tops	.05
Celery	.04

SODIUM:

Aids in elimination of uric acid.

Beans (dried)	.26
Spinach	.20
Corn, sweet (dried)	.20
Raisins	.19
Olives	.17
Peas (dried)	.16
Endive	.15
Carrots	.13
Turnip Tops	.11
Leeks	.11
Celery	.11
Radishes	.11
Prunes	.10
Cauliflower	.10

SULPHUR:

Purifies the blood.

Lentils	.28
Peas (dried)	.23
Beans (dried)	.22
Corn, sweet (dried)	.16
Chard	.12
Cauliflower	.09
Leeks	.08
Cabbage	.07
Turnips	.07
Dates	.06
Figs	.06
Onions	.06
Parsnips	.06
Raisins	.06

SILICON:

For growth of hair, nails; helps intestinal troubles.

(Chief Foods)
Spinach
Onions
Lettuce
Tomatoes
Asparagus
Cucumbers
Oats
Barley
Celery
Watermelons
Strawberries

Min′eral Waters, strictly speaking, are waters impregnated with mineral solutions by natural processes; but the term is commonly applied to all waters which possess real or even fancied therapeutic value other than that of ordinary water. In consequence hot springs are often spoken of as mineral springs when used for medicinal purposes. The ancients had great faith in all waters which felt or tasted other than the common "springs which run among the hills." Josephus mentions the visits of Herod to the warm baths of Callirrhoe near the Dead Sea. Tiberias was famous for its springs of hot sulphur water. The Romans frequented the gaseous springs situated in southern Italy, much visited by tourists to-day. The springs of Karlsbad, Aix-la-Chapelle, Baden-Baden and Ems are well known. In our country Saratoga has been a resort ever since the settlement of New York. White Sulphur Springs in Virginia, Hot Springs in Arkansas and many others are popular resorts. It is impossible to divide the springs into any well-defined classes as salt springs often contain sulphur, and alum springs may hold a dozen other minerals in solution besides the one giving the water its name. The best known springs, those at Saratoga, contain more of chloride of sodium (common salt) than of any other or all other mineral substances, bicarbonate of lime standing second and bicarbonate of magnesia third. It is carbonic acid gas which gives these springs their delightful effervescence. In the United States there are about 300 springs whose waters are bottled and put on the market.

Mineral Wool is the thread-like filaments produced by the action of steam or compressed air upon vitreous substances in a molten state. The product is also called silicate cotton by some, as its principal material is silica. The fibers produced are used to incase boilers and steam-pipes, thereby preventing the diffusion and waste of heat. It also is of great value in deadening sounds. As it will not burn or rust and is not subject to the depredations of insects, it is of great value in many mechanical adjustments. The use of it increases every year. The best mineral wool is obtained from the melting of a cinder made by mixing together four parts of orthocase feldspar and six parts of dolomitic limestone.

Miner′va, in Roman mythology the goddess of wisdom. She seems to be the same as the Greek Pallas Athené. She was said to have sprung in full armor from the head of Jupiter. She was the patron god of Athens, and her statue by Pheidias adorned the Parthenon. In her hand she carried the spindle, needle and spool, and was skilled in all kinds of woman's work. She was patron of art and trades; painters, teachers and physicians invoked her aid. Minerva, like Athené, is represented in art with a grave and majestic countenance, armed with helmet, shield and spear. The olive-branch, serpent and owl were sacred to her. Her festival, held in March, lasted from the 19th to the 23d.

Minie, (*mē′nyā′*), Claudie Étienne, a French inventor, born at Paris, in 1804. He served in the army, rising from private soldier to major. His experiments in the improvements of firearms resulted in the invention of the Minié rifle in 1849. He made improvements also in rifle balls, cartridges and gun-barrels. In 1858 he was appointed director of a military school at Cairo, Egypt, by the khedive. He died in 1879.

Min′ing, the process by which mineral matters of commercial value are taken from their natural position and made available for shipment. The substances mined consist not only of metals and the ores of metals, but of various nonmetalliferous substances, as coal. In the broadest sense of the term mining may also include the mining of such substances as natural gas, mineral oils, clay, building-stone, natural fertilizers and salt, though other terms are commonly applied to the processes by which these substances are made available.

Occurrence. The materials mined occur in various forms, chief among which are (*a*) bedded deposits chiefly beneath the surface, (*b*) vein deposits and (*c*) surface deposits.

(*a*) Bedded deposits include (1) such bodies of valuable mineral matter as lie in beds essentially parallel to the associated layers of rock and (2) deposits which are disseminated through stratified rocks. Examples of (1) are many iron and all coal beds. An example of (2) is the copper in the conglomerate beds of the Lake Superior region. The former (1) are really layers of rock, formed later than the rock which lies below them, but before that which lies above. The second group (2) usually are of secondary origin; that is, the valuable mineral matter was concentrated where it now is after the rock was formed.

(*b*) Veins are the fillings of cracks or fissures in rock. The filling is generally accomplished through the agency of underground water, which dissolved the mineral matter from the rock, brought it to the fissures and there deposited it. Veins are called mineral veins or, often, lodes, if the material is valuable for commerical purposes. The walls of veins are often impregnated with useful mineral matter like that of the vein proper, and the term is then made to cover those parts of the walls which contain the valuable matter as well as the vein itself. Veins differ from bedded deposits in that they usually are more irregular, less continuous, and have no definite relation to the bedding planes of the rock. Both bedded and vein deposits may be horizontal, vertical or inclined at any angle. Bedded deposits usually were horizontal to begin with, but the beds of ore, coal etc. may have been tilted the same as the beds of rock above and below. Veins likewise occur in any position, depending on the direction of the fractures in which the vein stuff was deposited.

(*c*) The third class of ore deposits is represented by gravel, sand or earthy material, in which there is some useful mineral which can be extracted with profit. Thus certain deposits of sand and gravel, like those of Cape Nome and various mountain valleys of the western part of North America, contain gold. Tin ores sometimes occur in the same way. In such deposits mines are opened. The specific gravity both of gold and tin is much higher than that of the associated sand and gravel, and this fact is taken advantage of in mining. Running water is caused to flow over the gravel and sand with a current which can be regulated. It washes away the lighter material, leaving the desired metals or ores behind. This is the principle of the method known as *placer mining*. Mines in these loose surface materials are *placer mines.* Certain other surface deposits are mined, but in a very different way. Thus in certain marshes and bogs bog-iron ore accumulates. This, in reality, is a bedded deposit, but is of recent origin, and not buried beneath later beds of rock or sediment. If worked at all, the ore is taken out bodily. Bog-iron ore is at present but little used.

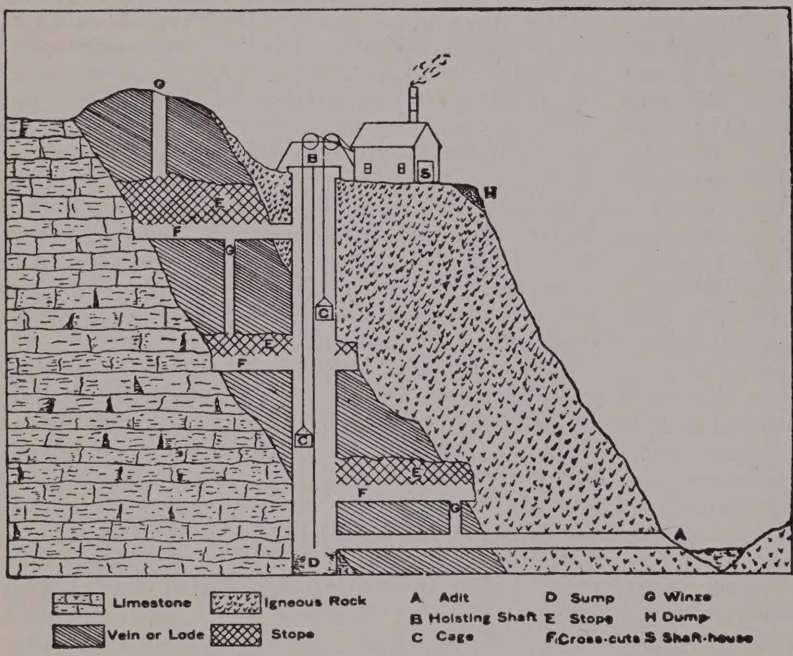
The Problems of Mining. After the existence of valuable deposits of mineral matter has been determined, many conditions affect the method of mining it. These conditions are so complex that they must be considered individually in the case of each mine. In each case the methods must be adapted to the local situation. The aim always is to extract the maximum of ore with the minimum expenditure of time and money and with the least danger to life and property. The first things to be determined are (1) the shape and position of the ore body, whether it is in distinct beds or veins or disseminated through a large mass of rock; whether the veins or beds are horizontal, vertical or oblique etc.; whether it is near the surface, far from the surface or both; (2) the extent of the ore body; (3) the character of the ore itself as regards hardness, tenacity etc.; (4) the nature of the rock in which the ore occurs, so far as concerns its hardness, texture, structure etc.; (5) the topography of the immediate locality where the mine is located. Questions of another sort, as facilities for transportation to and from the mine, water supply, fuel supply etc., have to be considered in connection with every mine.

Various means are employed for the determination of the exact position of the ore body. This is the work of exploration. Exploration is carried on partly by sinking small test pits; partly by stripping the loose material from the surface, exposing the rock which contains the substance to be mined; partly by shafts sunk into the rock; partly by the help of the compass, as in the case of magnetic iron ores; and partly by means of drill holes. In each case the methods of exploration best fitted to the situation should be adopted. The test pits are very much like open, shallow wells. The stripping of the surface is the method often adopted where the mineral vein comes to the surface of the rock, but is covered by soil and other loose débris. Vertical shafts are often sunk alongside the vein, and tunnels or cross-cuts are then run from the shaft across the vein. Veins are often cross-cut in this way in many places by way of exploration. The drills which are used in preliminary tests are hollow iron tubes having an inner diameter of one or two inches. In the "bit" at the lower end of the tube diamonds are set. With the bit resting on the surface of the rock to be drilled, the tube is made to rotate at high speed and cuts its way down into the rock. A cylindrical core of rock appears in the tube or "core barrel" as the drill descends. Water is constantly pumped down the inside of the tube, and rises between the drill rods and the wall rock, washing up the fine grindings of the drill. With the drill it is possible to obtain specimens of the rock at various depths, and this is often of value in the further work of the mine. Drill holes have been made several thousand feet deep. This method of exploration is expensive, but effective.

Another problem with which the miner has to deal is the approach to the ore body. Roughly speaking, mining methods may be divided into two general classes: (1) surface mining or open work and (2) underground mining.

Open work is done where a small amount only of worthless material must be removed in order to uncover the deposit. This method is employed, for example, in the iron mines in the Mesabi range in Minnesota, where the ore is covered by glacial drift 10 to 100 feet thick. Such covering may often be stripped off with steam shovels. Where the ore is soft and friable, as in the case of some of the iron ore of the Mesabi range, it too can be removed by steam shovels; but if the material to be mined is hard, it is blasted and taken out in masses.

In underground work the cheapest and easiest method, if the topography and the position of the material to be mined permit, is to approach the ore by tunnels. This may be done where the ore body lies in the side of a hill or mountain, so that it may be approached from the side. If the ore can be taken out through a tunnel, it saves the expense of hoisting it up through a shaft. The tunnel often also saves the expense of pumping out the water, which often is a troublesome factor in mining. In many cases, however, it is necessary to approach the ore by a shaft. The shaft may be either vertical or inclined, according to local conditions, especially according to the position of the ore body. The inclined shaft is sometimes known as an incline. A shaft is usually rectangular in section. In very small mines it may be no more than four feet square, but in large mines the shafts are much larger, large enough to permit the working of at least two hoists, called cages or skips. There must also be room for pipes, both for carrying down compressed air and for the carrying out of water. Large mines frequently have shafts as much as 12x18 feet in diameter.



If the material to be mined lies in a horizontal bed, the shaft is sunk down to the level of the material to be mined or a little below. Tunnels are then made, leading sidewise from the shaft into the substance to be mined. The material to be mined is worked out along these tunnels, carried to the shaft and hoisted to the surface. When the material which is being mined is worked out, it often is necessary to put in timbers to keep the mine open. If, for example, a horizontal bed of coal is being mined, the taking out of the coal leaves the rock above unsupported. Timbers may be put in to hold up the roof, or columns of coal may be left here and there to serve the same purpose. Where practicable, the tunnels driven from a shaft are made to rise slightly from the horizontal, so that the water encountered in the tunnel may drain into the sump or pool at the bottom of the shaft. From the sump it is pumped out. The slight inclination of the tunnel also facilitates the transfer of the substance mined to the shaft. If the tunnels are parallel with a mineral vein, they are called drifts. When they cut the vein, they are called cross-cuts. Tunnel is a rather indefinite name which may be applied either to drifts or cross-cuts. The process of drifting and cross-cutting is called "driving a level." Tunnels are usually as much as 6x6 feet in section. Tunnels are often run at various levels; for example, tnnnels may be run at the 50-foot level (that is, 50 feet below the surface), at the 100-foot level, at the 150-foot level and so on. When the drifts and cross-cuts have been made, and the different levels put in communication by vertical shafts, the ore between the various openings is said to be "blocked out."

Some ore has been extracted in the process of blocking out the ore. When a body of ore has been blocked out, extraction of ore begins in earnest. The processes employed for loosening the substance to be mined are various. Sometimes it is loosened by the pick or some other sort of hand-tool. Sometimes it already is soft or incoherent. Often it is so hard that it must be blasted. Ore is often worked from below rather than from above. That is, ore between the 50-foot level and the 100-foot level is often worked from the latter and carried along it to the main hoisting shaft. The working out of the ore between levels is "stoping."

Another problem which the miners have to encounter is the drainage of the mine. In most deep mines the amount of water seeping in is great, and it must be pumped out about as fast as it enters. For this purpose force-pumps are used. In deep mines several or many force-pumps may be needed. Pumps which are able to elevate the water 300 or 400 feet each are in common use. In mines near deep valleys it sometimes is possible to secure drainage by driving a drainage tunnel or "adit" from the shaft to the valley.

Still another problem which has to be faced in mining is that of ventilation. In coal-mines where noxious gases are sometimes plentiful, in mines where many men are at work, in mines where there is much blasting and in deep mines where the temperature is high at the bottom ventilation is of the utmost importance. Ventilation may be either natural or artificial

In shallow mines the hoisting shaft is usually large enough for ventilation. If there are several shafts connected with one another, the circulation of the air in the mine is facilitated. If there is an adit, it helps still further. Artificial circulation is secured by fans placed at the entrance of mines, or by the use of compressed air which is carried into the mine. Compressed air is often introduced for power, and as it escapes it serves for ventilation as well.

Transportation. When the material to be mined has been loosened from its natural position, it is carried to the main gangways in barrows, chutes or cars. In the main gangways are tramways. The cars are of iron or wood, with wheels so close together that the cars can be run on short curves. The motive power is furnished by men, mules, steam engines or electricity. In vertical shafts the material is hoisted in buckets or cages. In inclined shafts, the hoisting is done with skips. The skips are on wheels, the rear wheels being much larger than the front ones. When the skip reaches the horizontal dumping platform at the top, the forward pitch dumps the ore automatically. The hoisting power in large mines is steam or electricity.

Ore Dressing. In most instances the ore must be subjected to a preliminary treatment before it is fit for metallurgical processes. The method of treatment varies with the ore. In many cases the masses and lumps of ore are crushed, or even ground to powder, often by the pounding of huge hammers in a stamp mill. The valuable part of the ore is then separated from that which is without value, the process of separation being different in different cases. Where the ore is much heavier than the waste, the separation is brought about through differences in specific gravity. The final extraction of the metal, like the preliminary treatment of the ore, differs with the nature of the ore. Gold, for example, is passed over a copper plate coated with mercury. The mercury forms an amalgam with the gold, and is afterward separated from it by heating until the mercury is volatilized. At this stage the product passes from the hands of the miner to the hands of the metallurgist. Ores of other metals are treated by other processes. The concentration of the crude ore is milling. Under this term the extraction of the metal from the ore is also sometimes included. Properly speaking, the process of mining ceases when the ore is ready for the mill or for shipment.

R. D. SALISBURY.

Mink, the name of several carnivorous animals, the fur of which is especially valuable. The mink is related to the weasel, but is stouter of body, has larger and partially webbed feet, and has a bushier tail. The European mink is a little smaller than the American mink, and is more northern in its range. The Siberian mink has fur of a clear, tawny-brown color. The American mink is fifteen or twenty inches long, with a tail of eight or nine inches. It is yellowish-brown or dark-brown in color with a white spot on the chin and sometimes on the chest. The darker the color, the more highly prized is its fur. This little animal is still found in wooded lands in widely-scattered portions of North America. It lives along the banks of streams and hunts both in water and on land, either by night or day. It is a great nest-robber, being fond of birds. It is a famous mouser, and also eats frogs, fish, lizards and grubs. In winter it chases rabbits over the snowy ground. The mink can almost equal a fish in swimming, and on land is wonderfully agile, well-able to take care of itself. Its body is long and supple, and, notwithstanding its short legs, it can elude almost any pursuer, as it takes advantage of every hiding place, disappearing as if by magic. It can climb like a squirrel. The young begin life in a cozy home prepared in a hollow log or stump, hidden in the tall growth near a stream or in a hole among rocks. Among its enemies are the owl, the fox, the wild-cat, the dog and the otter. When cornered, the mink is a foe to be reckoned with.

Minneapolis (*mĭn-ē-ăp'ō-lĭs*), the largest city of the State of Minnesota and the seat of Hennepin County, is situated at the Falls of St. Anthony on the Mississippi River about 167 miles south of Duluth, and 425 miles northwest of Chicago. The city lies about ten miles distant from St. Paul, but adjoining suburbs stretch out along the way presenting an appearance of one large city, hence the name popularly applied to Minneapolis and St. Paul, "The Twin Cities." The name Minneapolis is derived from the Sioux word *minne,* meaning "water," and the Greek word *polis,* meaning "city."

Minneapolis is built upon a wide plateau through which the Mississippi River winds dividing the two sections of the city somewhat unevenly. The greater part of the city extends along the western shore of the river. This city is one of the most attractive of the Middlewest. One-tenth of its area is devoted to parks, which, abounding in the natural beauty of the surrounding country, are of especial scenic interest. Four natural lakes lie within the city limits, providing boating, fishing, and bathing during the summer season and ice boating and skating during the winter months. Lake Minnetonka, a renowned resort in the United States, is situated just fourteen miles from Minneapolis. Here countless bays, islands, and wooded shores create an atmosphere especially conducive to peace and enjoyment of the lover of the out-of-doors and the beauties of nature. It has grown to be a favorite summer resort for local residents as well as attracting many visitors from nearby states. The lake derives its name from a Sioux Indian word meaning "Big water." The Minnehaha Creek, a small stream, flows out of Lake Minnetonka and feeds Minnehaha Falls. Longfellow has immortalized these falls of scenic beauty in his epic poem *Hiawatha* calling them

"Laughing Water." The Minnehaha Falls have a drop of sixty feet with only a small volume of water flowing over the crest, but are noted for their beauty as well as the literary and historical value. Fort Snelling and the Minnesota Soldiers' Home are located near by.

Minneapolis is a center of culture. Its public schools rank very high. Almost in the center of the city, spreads the spacious campus of the University of Minnesota. The city has also built a magnificent public art museum and maintains by public subscription the Minneapolis Symphony Orchestra, pronounced by critics to be one of the four great orchestras of the country. The private art gallery of T. B. Walker contains a valuable collection of paintings, pottery and jades. Other educational institutions within the city are: Minnesota College; Saint Margaret's Academy; Stanley Hall; Graham Hall; Minneapolis School of Fine Arts; Northwestern Conservatory of Music; Dunwoody Institute; Blake School; de la Salle Institute; Augsburg Seminary, and McPhail School of Music.

Besides the natural beauty of the city, much has been done by the hand of man to add to its outstanding features. Steadily, new, handsome, larger and taller buildings are being constructed, noted for their architectural beauty. Notable buildings include the combined Court House and City Hall, a granite structure costing $3,500,000, the eighteen story First National-Soo Building, the McKnight Building, the Radisson, Nicollet, Dyckman, Curtis and West Hotels, the fourteen story Minneapolis Athletic Club, the Great Northern Station, Schubert, Hennepin-Orpheum and Auditorium theatres. The most outstanding churches are the Pro-Cathedral of St. Mary; the Hennepin Avenue Methodist Episcopal Church, housing a splendid gallery of sacred art; the Westminster Presbyterian, and St. Mark's Episcopal.

The natural physical features of Minneapolis have been the chief reasons for its great industrial growth. It is the gateway of the great agricultural area and the forest regions extending to the Northwest. St. Anthony Falls is the head of river navigation and also supplies more than 57,000,000 horse power units of water power for the manufacturing of diversified products. The principal industries are flour milling and the manufacturing of lumber into furniture and lumber products. A saw mill built in 1850, was the beginning of this vast industry. Minneapolis is an important flour milling city of the world, shipping over 18,000,000 barrels annually to all sections of the globe. It ranks first among American cities in the production of linseed oil. Minneapolis is also the leading grain market of the world. More than fifty grain elevators are located here holding over 40,000,000 bushels of grain. The principal manufactures other than those mentioned, include foundry and machine shop products, farm implements, boots and shoes, clothing, copper, tin and sheet iron, store and office fixtures, structural and ornamental iron, jewelry, confectionery and butter. The city is also a large wholesale and jobbing center of the northwest, with all the main trunk line railroads running to or through it. This includes nine major systems with twenty-six separate lines.

One of the civic projects which deserves commendation is that of sewage disposal. The Mississippi has its source in the many lakes in the northern part of the State, many of the early settlements including Minneapolis and St. Paul owed their existence to the river and the facilities afforded by it. The river now furnishes great amount of power for industrial and domestic uses. The Mississippi is the principal source of water supply for the Twin Cities as well as for twenty or more municipalities in Iowa, Illinois and Wisconsin.

The dam known as Twin City Lock and Dam was constructed in the river between Minneapolis and St. Paul in 1917. This is about thirty-three feet in height. All but one of the sewers of Minneapolis, and several of those of St. Paul discharge into the river above the dam. The construction of the dam has so retarded the current of the river as to permit the deposit of large quantities of sludge on its bed in the pool above the dam.

An act creating the present Metropolitan Drainage Commission was passed by the Legislature in 1927. This Commission has received hearty co-operation of the Minnesota Department of Health, particularly in connection with the continuation of the stream pollution studies begun by the United States Public Health Service.

The Minneapolis Civic and Commerce Association established the Gateway Tourist Bureau, which is located near the Union Station, and in 1928 registered 56,810 tourists, including parties from every state of the Union, from seven provinces in Canada, and sixteen from foreign countries. The headquarters for this Bureau are provided by the Board of Park Commissioners and financed by the Minneapolis Civic and Commerce Association. Information is supplied on road conditions and routings to any point in the country. Hospitality has become big business in Minneapolis with the slogan, "Serving her visitors, she serves herself."

Hennepin, one of the Jesuit Fathers, who toiled with La Salle in missionary work in the vast wilderness of the new world, is the patron father of Minneapolis. He discovered the falls of the Mississippi River in 1680 and named them for St. Anthony. In the following century, in 1766, Jonathan Carver reached the Mississippi River and wrote a description of the Falls and the beauty of the surrounding country. Lieutenant Pike of the United States Army came in 1807 to further the interests for the United States, this territory lying between the Mississippi and Minnesota Rivers against England. He was responsible for negotiating peace between the Chippewa and Sioux Indian tribes, and from the latter he secured a piece of land on either side of the river including the falls, which now is a part of the present site of Minneapolis. The east side of the river was the first to be populated and this settlement was named St. Anthony, and it was not until 1856 that the west side of the river was opened to settlers. Colonel Leavenworth built Ft. Snelling as a military post for the United States in 1820. Three years later the government built a lumber and flour mill. Squatters settled on the reservation at Ft. Snelling, and a village steadily grew until 1855, when squatters' rights were legalized. By 1872 the two settlements on either side of the river combined into one village and in 1856 with the settlement around Ft. Snelling, drew up a charter with the name of Minneapolis. By 1867 the town had grown to the proportions of a city and has continued to grow in size and wealth very rapidly.

In 1930 the population was 464,356.

Minnehaha (*mĭn-ê-hä′hä*), **Falls of**, famous American waterfalls are situated in one of the public parks of Minneapolis near Fort Snelling and the Minnesota Soldier's Home. The Falls have a height of sixty feet and although not large in volume, possess rare beauty. They are fed by Minnehaha Creek, a small stream flowing out of Lake Minnetonka, the nationally famous lake resort west of Minneapolis. The name means "Laughing Water." Longfellow immortalized Minnehaha Falls in his poem, *Hiawatha.*

Minnesinger (*mĭn′ē-sĭng-ẽr*), the collective name for German lyric poets who flourished from the middle of the eleventh to the close of the thirteenth century. They, however, not only wrote the poetry but composed the music for their love songs. They sang mostly of love, as indicated by the German word *minne,* meaning love. They often roamed from castle to castle and from court to court as did the troubadours, reciting or singing their songs. The chief exponents of this feudal verse are Walther von der Vogelweide and Wolfram von Eschenbach. The songs of 160 of these singers are preserved. After the decline of their art the meistersinger (mastersingers) took their place. Unlike the minnesinger, who were of the knightly or courtier class, the meistersinger were men of the artisan class, who formed themselves into guilds and wrote poems as they plied their tasks. Although there is little real poetry in the songs of the meistersinger, they were popular for three centuries, the last guild being dissolved in 1830.

Minnesota (*mĭn-ĕ-sō′-tȧ*), "The Gopher State" one of the Northwest Central States of the American Union. Geographically it is situated in the center of North America and its northern boundary extends along the Canadian provinces of Manitoba and Ontario. It is bounded on the east by Lake Superior and Wisconsin; on the south by Iowa, and on the west by the Dakotas. The State covers 84,682 square miles, 3,824 square miles of which are covered by numerous lakes and rivers. The Mississippi river rises in Minnesota, and a network of lesser rivers and 10,000 lakes add materially to the natural beauty of the State.

The name Minnesota is derived from two Indian words from the Sioux tribe, meaning "sky colored water." On the seal of the State, which was adopted in 1858, appear the words *Etoile du Nord,* meaning the "Star of the North".

Surface. The central and southern portion of this State is a large rolling prairie and forms a part of the Prairie Plains Province, so named by the French explorers. To the north and east extend low mountains and ridges of hard rock worn down by erosion and left from the glacial action. In the north are large pine forests and in the center of the State extends a valuable forest called the Big Woods. To the northwest is a broad flat valley along the Red River which sediment left from old Lake Agassiz. The "Coteau des Prairies" extends across the southwestern counties with an elevation of 1,700 feet.

In Minnesota are the sources of the three great river systems of North America. The Red River of the North, which flows into Hudson Bay, rises here; the St. Louis River and others entering Lake Superior find their way to the Atlantic Ocean; and the Mississippi starts from Lake Itasca on its long journey to the Gulf of Mexico. The Mississippi flows for 746 miles in Minnesota and adjoining territory, now through rapids and falls, as at Sauk Rapids and St. Anthony, and now broadening into lakes, as Lake Pepin. It is navigable to within 192 miles of its source. About one-third of this State, lying at the south and southwest and reaching in the Red River valley to the international boundary, is made up chiefly of prairie. The remaining two-thirds on the northeast were originally wooded. Now farm lands spread over this land that has been cleared. The altitude above the sea level ranges from 602 feet at the shore of Lake Superior to 2,230 on Misquah Hills, the highest altitude in the State, north of this lake. The Mississippi River drains about 47,000 square miles in Minnesota; 7,700 square miles of which are tributary to Lake Superior and the St. Lawrence. About 9,700 square miles are drained to Rainy River and the Lake of the Woods, and approximately 18,300 square miles to Red River, making altogether 28,000 square miles in this State tributary to Lake Winnepeg, and through Nelson River, to Hudson Bay. With the many wooded lakes scattered throughout the State, with bays and waters filled with choice fish, the State is noted for its scenic beauty and resorts for tourists, fishermen and hunters.

Climate. Minnesota, for the most part enjoys a clear dry climate and because of this atmosphere the severe temperatures recorded during the winter season are not disturbing to the inhabitants. The thermometer drops to as low as forty degrees below zero in the northern part of the State, and temperatures ranging between ninety degrees and 100 degrees during the summer months are common in the Twin Cities and regions to the south.

The rainfall is heaviest in the eastern half of the State, averaging 33.3 inches annually, while it is less than twenty-five inches in the western and southwestern portions of the State. Considerable snow falls throughout the State.

Minerals. The northeast section of the State is especially rich in iron ore deposits, principally red hematite. The ore is found very close to the surface making the mining of it cheap and easy of access. The richest vein in the world is found in Mesaba Range. The Vermilion Range is exceedingly productive. Over sixty per cent of the ore of the United States is produced from these mines and carried through the Great Lakes to Pennsylvania, Ohio, Indiana and Illinois where it is smelted and manufactured.

Considerable amounts of granite, limestone and sandstone are quarried in Minnesota which produce excellent building stone. Gravel, sand and clay are found in large amounts, creating a large industry for the manufacturing clay products.

Production and Industry. Minnesota is essentially an agricultural State, producing huge crops of cereals, including corn, barley, wheat, oats, hay, forage crops, and potatoes. Flax, vegetables, flowers, plants and nursery products fruits and nuts are also grown, apples being the leading orchard crop.

Minnesota had 185,255 farms covering 30,913,367 acres, 18,445,306 acres of which were under cultivation in 1931. This property was valued at $217,252,000.

Livestock is an important farm industry. In 1931, 4,561,546 pounds of wool were clipped. In 1933, there were 3,343,000 cattle in the State, 1,742,000 of which were milch cows. The farms and buildings were valued at $2,130,310,973 which emphasizes the great wealth of this industry.

Minnesota leads all other states in the Union in flour and grain mills, this industry being valued at $158,963,156, the output from 108 mills in 1929. The meat packing industry production was valued at $201,155,942 in that same year. Butter and cheese were valued at $128,704,989.

At one time Minnesota was among the leading states in the production of lumber. To-day it ranks eleventh in output, the lumber cut in 1931 amounting to 94,968,000 board feet. Spruce, which is in demand for paper wood pulp as the supply is rapidly diminishing, is the principal wood. White pine, birch, larch, cottonwood and balsam are among other important woods found in the State. Besides the manufacturing of lumber and lumber products, the milling, meat packing, and dairying industries, Minnesota has many railroad shops, foundry and machine shops, linseed oil factories, leather boots, shoes, woolen goods, brick and lime factories. The leading industrial cities are Minneapolis, St. Paul, Duluth, Winona, Mankato, Stillwater and St. Cloud.

Transportation. The Twin Cities are among the great terminal points for transcontinental railway traffic in the United States. Nine roads radiate from St. Paul. The chief railroads crossing the State are the Chicago and Northwestern; the Chicago, Burlington and Quincy; the Great Northern; Northern Pacific; the Chicago, Milwaukee and St. Paul; the Chicago, Rock Island and Pacific, and the Minneapolis St. Paul and Sault Ste. Marie.

Water transportation is equally important in Minnesota. Seven navigable rivers flow through the State, the Red, the Rainy, the Minnesota, the Redlake, the St. Croix, the St. Louis, and the Mississippi. Lake Superior is the outlet for great quantities of freight carried to the East and on to foreign markets. Duluth is one of the leading shipping points of the country.

In addition to the 660 miles of electric railways, and 9,285 miles of steam railroads in 1931, Minnesota maintains a fine network of highways of paved and gravel roads.

Population. The State has been fortunate in having a large influx of immigrants from the northern countries of Europe, especially the Scandinavians, and also Germans. In the earlier days of development these nationalities settled in large groups and have helped shape the destiny of the State, characterizing it for its thrift, industry and sturdiness.

The population has rapidly increased since the first census taken of the State in 1860. In 1930, 2,563,953 people resided in the State, fifteen per cent of whom were foreign born whites. Nearly one-half of the inhabitants dwell in the cities, a tendency which has been increasing in nearly all the states of the Union.

Minneapolis, with a population of 464,356 in 1930, and St. Paul, the capital, with 271,606, the Twin Cities, are situated in close proximity in the east central section of the State. Other leading cities of Minnesota with their populations in 1930 are: Duluth, 101,463; Winona, 20,850; Rochester, 20,621; Mankato, 14,038; St. Cloud, 21,000, and Hibbing, 15,666.

Education. Minnesota has a highly organized system of public education which ranks as one of the best in the world. It links the kindergarten, through the elementary and high school, to the State university which is at the head of the system. The school law was amended in 1919, which provided for a board of education to be appointed by the Governor. This board, made up of five men, in turn appoint a Commissioner of Education. The Commissioner serves a term of six years and is in charge of the State system of education. Each county has a superintendent who conducts the educational work in his district and who is directly responsible to the Commissioner.

There are six normal schools in the State for the training of teachers for the elementary and high schools. These schools are located at Duluth, Bemidji, St. Cloud, Winona, Mankato and Moorhead and are supervised by a special school board. In 1930-31 were 7,097 students enrolled in these colleges which had a faculty of 240.

The State aids local districts with appropriations and gives special assistance to graded elementary, high schools, consolidated and rural schools so as to maintain the high standards required by the State Board of Education. The State exacts a one-mill State tax, the proceeds of which are distributed to school districts according to the number of pupils in attendance during the minimum number of days of the school year.

The University of Minnesota is one of the best and largest state institutions of higher learning in the United States. It was provided for by a territorial legislature in 1851, and in 1869, it was opened for instruction at Minneapolis. It is a coeducational institution and during the school year of 1932-3 had 13,225 students enrolled with a faculty of 580. Besides the graduate school, the University is composed of colleges of science, literature and art, engineering, architecture, agriculture, forestry, home economics, law, medicine, dentistry, mining and analytical chemistry. Extension courses through correspondence are also provided to those who so desire to avail themselves of a higher education.

The Mayo brothers, of Rochester, turned over in 1915 the facilities and privileges of the Mayo Foundation to the use of the University. This placed all medical instruction in the State under the supervision of the University.

Other important colleges in Minnesota, much smaller in enrollment and under the control of some denominational group, are Hamline University at St. Paul, St. John's University at Collegeville (a Roman Catholic institution), Carleton College at Northfield, and St. Olaf College at Northfield.

Government. The State differs somewhat from other states as to its government. There are eighty-seven counties which in turn are divided into townships of six miles square. These are divided in thirty-six sections, numerically numbered and organized with corporate town meetings. Each unit has three supervisors and sub-officers elected for two-year terms. Each county has an area of about 400 square miles and an average population of 8,000 inhabitants.

The cities are divided into four classes according to population and are governed by their own charters, usually with a mayor and his council, or by a commission.

The State Legislature contains the two bodies, the Senate and House of Representatives. There are sixty-seven Senators elected for four-year terms and 131 Representatives elected for two-year terms. The constitution by which the State is governed was adopted in 1857 and to amend it there has to be a majority vote of both houses with a majority vote at a popular election.

The executive department of the government consists of the Governor, Lieutenant-Governor, Secretary of State, Treasurer, Auditor and Attorney-General, all of whom serve two-year terms with the exception of the Auditor, who is elected for four years. The Governor is invested with the power of vetoing certain appropriation bills and a two-thirds vote of both houses is required to pass over such vetoes. The legislature meets biennially with the sessions limited to ninety legislative days. The State is represented in the National Congress in Washington by two Senators and nine Representatives.

History. The first known white men to visit the territory which is now Minnesota were Radisson and Groseilliers, two French trappers who explored the Mille Lacs region in 1659-1660. Du Shout, another Frenchman, built a fort on the north shores of Lake Superior in 1668. By 1670 the missionaries followed the trails of the traders and Hennepin was the first to come to this region and discovered the St. Anthony Falls. Trading posts were established along the shores of the lake and the rivers by the fur trappers and in 1686 Nicholas Perrat took possession of the territory in the name of the French crown.

At the close of the French and Indian War in 1763, this region was ceded to the English and following the Revolutionary War was again ceded to the United States. However, full rights to the territory were not granted until the United States completed the Louisiana Purchase in 1803. Until 1805 the region was sparsely settled and the first permanent settlement was established at Ft. Snelling, a United States Military post in 1819. For some time the region east of the Mississippi River was a part of Indiana territory, later transferred to Michigan territory, and finally a part of Wisconsin territory. When Wisconsin and Iowa became states the boundaries grew smaller and in 1849 with a population of 5,000 inhabitants the territory of Minnesota was organized with the west boundary extending to the Missouri River. This included most of the territory which now comprises the states of South and North Dakota.

The Indians did not relinquish their rights to their old hunting grounds until 1838 and it was not until 1862 that the Indians were entirely subdued. It was in that year that the Sioux Indians had an uprising and killed 600 white men. This retarded the settling of the State, which had been admitted to the Union in 1858.

Following the Civil War, a large influx of immigrants came to the United States and settled in Minnesota. Since 1865 the population has increased rapidly. The State succeeded in developing its resources so that it now ranks as one of the wealthiest agricultural states.

Minnesota is unique in the development of a distinct political organization. Between 1915 and 1922 the Working People's Non-Partisan

League was formed which resulted in forming many new labor unions and a decided increase in membership of all. The State Legislature passed a reactionary primary law, providing that all state and local offices, including members of the State Legislature should be nominated and elected on a non-partisan ballot. The only exceptions were the state executive officers, the railway and warehouse commissioners and the clerk of the Supreme Court. Minnesota has the only members of the Farm Labor party in the United States Congress, represented by one Senator and five Representatives.

Minnesota has stood in the foreground in its participation in the Civil War and World War. It has the distinction of offering the first regiment in the Union army by the Governor. There were 123,325 men from Minnesota serving their country in the World War and nearly $500,000,000 were subscribed to finance it, by the residents of the State.

Minnesota, a river which crosses the State of Minnesota. It rises near Lake Traverse, on the Dakota border, and widens into Big Stone Lake, which stretches for thirty miles along the same border, flows southeast until nearly across the State, and then with a sharp turn flows northeast into the Mississippi at Fort Snelling, five miles above St. Paul. It is 475 miles long, 300 miles of which are navigable.

Minnow (*mĭn′ō*), the name commonly applied to small slender fishes. The true minnows belong to the family *Cyprinidæ,* and grow to about three inches in length. They are abundant in the Old World and in North America. Although numerous in species, they are difficult to distinguish on account of great similarity. Like birds, the male minnows often put on bright colors during the breeding season, and some kinds have the head ornamented with tubercles. The so-called American minnows (*Notropis*), of which there are about 100 species, are confined to the waters east of the Rocky Mountains. Minnows are of importance as food for larger fishes, and they are extensively used as bait by fishermen.

Minorca (*mĭ-nôr′kȧ*), the second largest of the Balearic Islands, is situated in the Mediterranean Sea, twenty-five miles northeast of Majorca. It is twenty-eight miles long and about ten miles wide, and has an area of 290 square miles. It has a rocky coast, with many inlets, and a fertile soil. It also has a great number of ancient megalithic remains and stalactite caves. The principal cities are Port Mahon and Ciudadela. The principal cities are Port Mahon and Ciudadela. The principal products of Minorca are wine, oil, grain, flax and sweet potatoes. Minorca, which is the seat of a bishopric, was ceded to Spain by England in 1802. The population of Minorca is about 40,000.

Minotaur (*mĭn′ō-tôr*), a monster referred to in Grecian mythology depicted as half man and half bull, the offspring of Pasiphæ. He was fed with seven youths and seven maidens, sent from Athens at certain periods, until slain by Theseus with the help of Ariadne.

Mint, a general name of species of the great family *Labiatæ,* but which is especially applied to the species of the genus *Mentha,* ordinarily recognized by their peculiar fragrance and their clusters of small purple, pink or white flowers. The genus contains about thirty species, all native to north temperate regions, twelve of which either are native or naturalized in North America. Their characteristics are square stems, opposite or whorled leaves, a spicy fragrance or "minty odor" and four-lobed ovary. In little glands in the leaves is secreted a volatile oil, which gives the plant its pungency. Peppermint (*M. piperita*) is the most important species in cultivation, and is one of the most important of plants in the production of essential oils. The leaves are dark green veined with purple; the stem is often purplish; the flowers are purple. The chief regions of peppermint cultivation in the United States are certain portions of Michigan, Indiana and New York. Spearmint (*M. spicata*) is also cultivated for its essential oil, but this is not so much in demand as peppermint oil. It is spearmint which is cultivated largely for table use in the making of mint sauce and mint julep. The leaves are wrinkled, serrate, short-stemmed or sessile. The small flowers are crowded around the stem in whorls.

Mint, a place where money is coined by the government of a country. It is a comparatively modern term in its restricted usage, as in early times in England the bishops and barons had the privilege of coining. Until the middle of the sixteenth century coins were made from pieces of metal cut and hammered. In 1662 the use of the screw or mill became common in England. This was the invention of Antoine Brucher, a French engraver. The gold or silver to be coined is melted and has added to it the amount of copper needed to make it hard enough for use, after which it is formed into bars. In the United States the silver coins are one tenth copper and nine tenths silver, and in the gold coins one tenth is an alloy or mixture of silver and copper and nine tenths gold. The bars are then passed between rollers which flatten them into strips or ribbons of the right thickness. The gold bars are usually rolled ten times before they are thin enough and the bars of silver eight times. The strips are finally drawn between steel blocks to make them straight. The strips are then cut into pieces of the right size, or blanks, which in the gold coins are weighed by hand before being finished off. If too light, they are sent back to be melted again, and if too heavy the edges are filed off. This is usually done by women, as their delicacy of touch fits them for the work. The blanks are now passed through the milling machine, which finishes the rims of the coins, and then into the coining press, where they are stamped with the figures and letters of the different coins. After careful weighing, and inspection and counting, they are put into bags and are ready for circulation. In the United States there are mints at Philadelphia, New Orleans, San Francisco, Carson City and Denver, and several assay offices where the metals are prepared for coinage. The mints are under the direction of a branch of the treasury department, called the bureau of the mint. The earliest money coined in the United States was copper cents in 1795, at Philadelphia, where the first mint was established.

Min'to, Gilbert John, G.C.M.G., fourth earl of, governor-general of India since 1905 and previously known in the Canadian Dominion under his junior title of Viscount Melgund, was born in 1845. Early in his career he entered the Scots Guards, was attached to the Turkish army on the Danube in the Russo-Turkish War of 1877, served in Afghanistan in 1879, and two years later accompanied Sir Frederick Roberts to South Africa as military secretary. During 1883-6 he was military secretary to Lord Lansdowne, then governor-general of Canada, and chief of staff in a short campaign against the insurgent Riel in the northwestern territories of the Dominion. He succeeded to the earldom in 1891. and in 1898 was appointed governor-general of Canada.

Min'ute Men. This is a name which has been applied to the disaffected American colonists who, as the Revolutionary War approached, took a pledge to take up arms if given "a minute's notice" only. The Provincial Congress of Massachusetts in 1774 passed an act which provided for the enrolment of such minute men. For war purposes their readiness and promptness were of the greatest importance as a guarantee of the nucleus of an army, even from the outset of hostilities.

Mirabeau (*mē'rä'bō″*), **Honoré Gabriel Riquette,** Count de, a great French statesman, was born at Bignon in Provence, March 9, 1749. He was badly scarred by smallpox at three years of age, and had a twisted foot and an unusually ugly face Yet his great ability and a personal power of fascination made him the idol of his companions. His father, a tyrant in his home, placed him in the army and twice secured his imprisonment. His life was wild, and at one time he was condemned to death for his flight with a married woman. While in prison he wrote his famous essay on *State Prisons* After his release he succeeded in having the sentence against him repealed, and made himself famous by his eloquent appeal in his own behalf. He spent his next years in writing pamphlets and books, and while on a secret mission for his government to Berlin obtained the materials for his *History of the Prussian Monarchy under Frederick the Great.* His political life began with the stormy days preceding the Revolution; and in the national assembly, when the king commanded the deputies to separate, he made the memorable answer: "We shall yield to nothing but bayonets." His dream was to place the king at the head of the Revolution and reform the government by a new constitution, guarded by a ministry, somewhat after the pattern of the English parliament. He tried to make terms with Lafayette and Necker, suggesting their names for the new ministry. He labored incessantly and with great power, but was opposed by the queen and mistrusted by the better classes in either party. "The sins of my youth," he bitterly exclaimed, "are giving me their full punishment now." In 1790 he was made president of the Jacobin Club and administrator of the Seine department, and later one of its eight directors. In January, 1791, he was made president of the national assembly. He opposed the law against emigration and the proposal that at the king's death a regent be elected by the French assembly. His health, ruined by his early excesses and his tremendous labors, was failing, and with prophetic foresight he said: "I carry with me the ruin of the monarchy." He died at Paris in his 43rd year, April 2, 1791, and was buried in the Panthéon. "Do not rejoice over the death of Mirabeau," said the king to his wife; "we have suffered a greater loss than you imagine." His was the one influence that might still have saved the throne. See *History of the French Revolution* by Carlyle; by Michelet; and by Taine.

Mir'acle-Plays or Mys'teries were plays performed in the middle ages, the subjects of which were taken from the Bible or the lives of saints. Miracle-plays were founded on legends, and the mysteries on the history of the Bible, but the distinction was not carefully observed. The plays were at first performed in the churches by the clergy and their assistants, but afterward on stages erected in the streets, and at one time every important place had its band of players. The first known specimen of these plays dates back to the 4th century. In 1110, in Dunstable, England, was exhibited the play of St. Catherine, the earliest mentioned in England. They were used at first as means of religious instruction, but became gradually corrupted by jests and vulgarities. After the Reformation they slowly declined, though the first blow against them came from the Roman Catholic church on the ground of their irreverence. The only modern instance of these plays is the Passion Play, which is performed once in ten years at Oberammergau in Bavaria, as the townspeople pleaded successfully to be excepted from the general condemnation in 1779. (See OBERAMMERGAU.) See *Miracle Plays* by Hase and *English Miracle Plays, Mysteries and Moralities*, by Pollard.

Mirage (*mē′rȧzh′*) is an appearance of an object in the sky or at sea above the water, produced by the rays of light changing their direction when they pass through a layer of hotter or of colder air. The mirage of the desert is the effect of the heating of the layer of air next the ground by the hot sands, thus bending the rays of light upward; while over water the effect is produced by the rays of light being bent as they pass from the cool layer of air next the water into hotter air above. Sometimes the object is seen in the sky upside down, occasionally only slightly raised, and sometimes there will be two objects, one upright and the other reversed. These effects are all explained by the different layers of hot and cold air through which the light passes. There have been some very remarkable mirages; as the *Fata Morgana* in the Straits of Messina, where men, houses and ships are seen, sometimes in the water and sometimes in the air. Captain Scoresby, while cruising off the coast of Greenland, discovered his father's ship by its image or reflection in the sky. On the Baltic, in 1854, the English fleet of 19 vessels, 30 miles away, was distinctly seen floating in the air. See *Optics* by Brewster.

Miramon (*mē′rȧ-môn′*), **Miguel**, a Mexican general, was born in the City of Mexico, Sept. 29, 1832. While still in the military academy, he, with his fellow students, engaged in defending Chapultepec in the war with the United States, and he was taken prisoner. Entering the army in 1852, he became colonel in 1855 and general when 25. When in command of a body of troops, he headed a rebellion against Alvarez, the president of the country at the time, and took the city of Pueblo, which he twice defended within six months, the second time for 43 days against 10,000 besiegers. He kept up his opposition to the government, as the head of the church party, and was finally chosen president in 1859, but declined the honor, reinstating Zuloaga, who retired in a few days, leaving Miramon in command. The war continued until 1860, when the Liberal party gained power and Miramon fled to Europe. Maximilian, to whose fortunes he adhered, made him grand-marshal and minister of Mexico to Berlin. He returned to Mexico in 1866, when Maximilian was reigning, and the latter persuaded him to give up his intention of resigning. As chief of the army he was captured and shot at Querétaro, with Maximilian, June 19, 1867. See *Mexico under Maximilian* by Kendall; *Young Folks' History of Mexico* by Ober; and *Mexico and Her Military Chieftains* by Robinson.

Miramichi (*mĭr′ȧ-mē-shē′*), a river in New Brunswick, flows into the Gulf of St. Lawrence about midway up the eastern coast, creating a large indentation. Near its mouth lie Newcastle and Chatham, and there is a fine harbor between them. West of Newcastle the Miramichi is divided in a great spray of branches which drain the middle of New Brunswick, and make its greatest lumber river, next to the St. John.

Mir′ror, a surface capable of reflecting light. Ancient mirrors, now found in tombs and sepulchral vaults, were for the most part made of solid, highly-polished metal; but upon the use of glass becoming common, that material took the place of heavier substances. The backs of the first glass mirrors were covered with a thin coating of lead, but the glass workers of Venice in the 17th century introduced an amalgam of mercury and tin which answered the purpose much better. A solid and perfectly level table of stone is first covered with a sheet of tin-foil, over which a quantity of mercury is poured,raised edges preventing the loss of it. Upon this liquid mercury a carefully-prepared plate of glass is slid in such manner as to exclude air-bubbles and impurities. The superfluous liquid is then run off, and by means of delicate and uniform pressure the amalgam is made to adhere to the glass. The plate, being lifted from its position, is turned with the coated side uppermost to dry. This process sometimes requires weeks.

Missionary Ridge. The battle of Missionary Ridge was fought Nov. 24 and 25, 1863, by the Union forces under Grant and the Confederates under Bragg. The latter occupied Lookout Mountain and Missionary Ridge, and the valley between, four miles wide. Hooker in command of Grant's right stormed and carried Lookout Mountain on the 24th, the Confederate lines being withdrawn to Missionary Ridge. On the same day Sherman crossed the Tennessee and on the morning of the 25th moved against Bragg's right which held the northern base of Missionary Ridge. Desperate fighting ensued, the Confederate lines being stubbornly held against Sherman's repeated assaults. In the afternoon Grant, who watched the struggle from Orchard Knob, ordered his entire center forward to attack the Confederate earthworks at the western base of the ridge. The four divisions forming the lines were from left to right Baird, Wood, Sheridan and Johnson, and they faced the ridge at distances from three quarters of a mile to a mile. At a signal the whole line charged under fire of 100 guns from the crest and in face of a rifle-fire from the entrenchments at the base. The entire line was taken, the Federal lines were quickly reformed, and without orders charged up the face of the ridge. The whole line gained the crest near together, and after a short struggle carried three miles of the crest, and captured 37 guns and about 2,000 prisoners.

Miss'issip'pi, one of the southern states of the Union, lying on the Mississippi River. It is bounded on the north by Tennessee, on the east by Alabama, on the south by the Gulf of Mexico and Louisiana and on the west by the Mississippi. It covers 46,810 square miles (the total land surface being 46,340 square miles), and is 335 miles long and 150 broad — about one sixth the size of Texas. The winters are mild, the summers hot, though tempered by the gulf breezes.

Topography. It has several large rivers — the Yazoo, 264 miles long, flowing into the Mississippi, the Pearl and the Tombigbee into the Gulf of Mexico. The country is hilly, except in the Mississippi bottomlands. These lands, lying between the Mississippi and the Yazoo River, are protected by levees, the funds for the purpose being raised by a tax on every bale of cotton. The coast extends only 90 miles, and is separated from the gulf by Mississippi Sound and a range of low islands.

Natural Resources. There are several fine mineral springs, the resort of tourists. The forests are valuable, covering 32,000 square miles of the land, the most valuable tree being the yellow pine. Forests of hickory, maple, ash, oak, gum, poplar and tulip are found. Mississippi also grows the long-leaved pine extensively in the southern portion. Phosphate-rock, gypsum, hydraulic lime and coal are found, but have never been worked to any great extent, and the clay and marl are regarded as leading in value. There also are oyster and shrimp fisheries.

Manufactures. Mississippi is not a manufacturing state, but is engaged to a considerable extent along special lines. Her leading industries are connected with timber and cotton. Turpentine and resin are produced, cottonseed-oil, oil cake and cotton goods manufactured. Cotton ginning, the manufacture of fertilizers, oyster canning and preserving also are among the prosperous industries.

Agriculture. The state is mainly agricultural, cotton being the great crop, besides corn, oats, rice, potatoes and sugar-cane. Vegetables of all kinds grow luxuriantly, and are sent to the northern markets. The cotton product is second only to that of Texas. All fruits of the temperate zone grow in abundance, as do figs and, in the southern portion of the state, oranges.

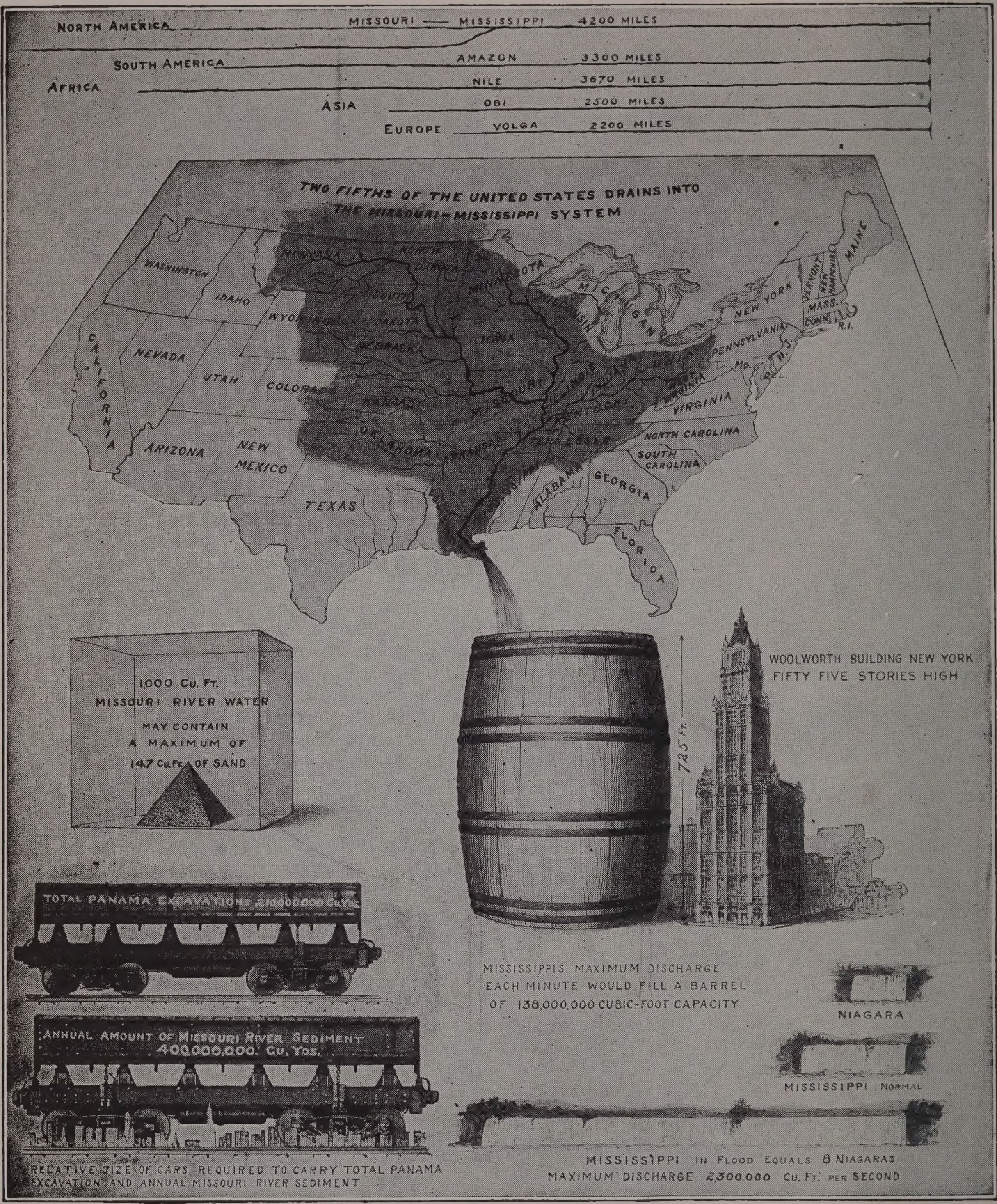
Education. Separate schools are maintained for the colored population, and in nearly every city and town graded schools are conducted for ten months. There are two public and two private normal schools, the school property is valuable, and a high standard of education is maintained. Among the higher institutions of learning are the University of Mississippi, founded in 1848, near Oxford; the Agricultural College, with an experiment farm, at Starkville; an industrial college for girls at Columbus; Mississippi College at Clinton; and schools for the colored youth at Tougaloo, Holly Springs and Jackson. The capital is Jackson, the other chief cities being Vicksburg, Natchez and Meridian. Population of the state 1,964,122, of which more than half is colored.

State Institutions. The State Deaf and Dumb Institute for white and colored and the state school for the blind (white) are at Jackson. Insane asylums are at Jackson and Meridian, state hospitals at Vicksburg and Natchez, and the state penitentiary is at Jackson. Mississippi has 3,480 miles of railway.

History. The first European to pass through this region was De Soto, but he left no settlements. La Salle took possession of the country in the name of France in 1682, calling it Louisiana. In 1699 and in 1716 forts were built on the bay of Biloxi and at Natchez. It was ceded to Great Britain in 1763. The state was organized as a territory in 1798, and came into the Union in 1817.

Mississippi (*mĭs-ĭ-sĭp'ĭ*), the largest river in North America and, from its mouth to the source of the Missouri (its largest branch), the longest river in the world. It rises in Minnesota, in Lake Itasca, is 2,960 miles long or, with the Missouri, 4,200 miles, and drains all the country between the Allegheny and Rocky Mountains, a region nearly as large as half of Europe. It has about 16,000 miles of navigable waters. The largest tributaries are the Missouri, Arkansas, Red, White, Yazoo and Ohio Rivers. Besides these there are about 240 smaller ones. There are falls at Minneapolis, Rock Island and the Des Moines Rapids. The river begins with a width of 12 feet, widening to 4,700 feet below the mouth of the Ohio, and measuring 2,500 feet at New Orleans. It flows, in the lower part of its course, through lowlands, often below the level of the river and protected by embankments for over 1,600 miles. After receiving the waters of the Red River, the Mississippi divides into many separate channels, called bayous, each making its way to the Gulf of Mexico, where it forms what is called the delta. The water of the Upper Mississippi is clear, but gradually grows dark and muddy as the great rivers along its course pour their turbid currents into it. It yearly carries enough earth into the Gulf to make a square mile of land 263 feet thick. These great deposits obstruct the mouth, and the government has expended large sums in providing a system of jetties or walls to protect the channel. (See BREAKWATER.) The river from the mouth of the Ohio is subject to extensive floods, the water stretching for miles over the lowlands many

WORK DONE BY OUR RIVER GIANT


NORTH AMERICA
MISSOURI — MISSISSIPPI 4200 MILES
SOUTH AMERICA
AMAZON 3300 MILES
AFRICA
NILE 3670 MILES
ASIA
OBI 2500 MILES
EUROPE
VOLGA 2200 MILES
TWO FIFTHS OF THE UNITED STATES DRAINS INTO THE MISSOURI–MISSISSIPPI SYSTEM
WASHINGTON
IDAHO
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
MINNESOTA
WISCONSIN
MICHIGAN
NEW YORK
VERMONT
NEW HAMPSHIRE
MAINE
MASS.
CONN.
R.I.
WYOMING
NEBRASKA
IOWA
ILLINOIS
INDIANA
OHIO
PENNSYLVANIA
N.J.
DEL.
MD.
CALIFORNIA
NEVADA
UTAH
COLORADO
KANSAS
MISSOURI
KENTUCKY
WEST VIRGINIA
VIRGINIA
NORTH CAROLINA
TENNESSEE
ARIZONA
NEW MEXICO
OKLAHOMA
ARKANSAS
SOUTH CAROLINA
GEORGIA
ALABAMA
TEXAS
FLORIDA
1,000 Cu. Ft. MISSOURI RIVER WATER MAY CONTAIN A MAXIMUM OF 147 Cu. Ft. OF SAND
725 Ft.
WOOLWORTH BUILDING NEW YORK FIFTY FIVE STORIES HIGH
TOTAL PANAMA EXCAVATIONS [illegible] Cu. Yds.
ANNUAL AMOUNT OF MISSOURI RIVER SEDIMENT 400,000,000. Cu. Yds.
MISSISSIPPI'S MAXIMUM DISCHARGE EACH MINUTE WOULD FILL A BARREL OF 138,000,000 CUBIC-FOOT CAPACITY
NIAGARA
MISSISSIPPI NORMAL
RELATIVE SIZE OF CARS REQUIRED TO CARRY TOTAL PANAMA EXCAVATION AND ANNUAL MISSOURI RIVER SEDIMENT
MISSISSIPPI IN FLOOD EQUALS 8 NIAGARAS MAXIMUM DISCHARGE 2300,000 Cu. Ft. PER SECOND

Courtesy Scientific American. (C) Munn & Co.

Our giant river system, the Mississippi, is a good farmer in some respects and a very thriftless one in others. The deposits it makes over the land in flood time furnish rich soil for crops, but it is constantly carrying away vast quantities of good farm land and pouring it into the Gulf. Sometimes, as in the spring of 1913, when several hundred people were drowned and thousands of homes swept away in the floods in Ohio and Indiana, it is still more troublesome. How to control this giant of ours, so that all its work will be useful, is one of the great problems which state and federal governments and the engineers are trying to solve. The building of the Panama Canal shows what gigantic tasks can be accomplished by working together along right lines.

of which are uncultivated because of this danger. The levees or embankments to prevent floods have been extensively built by the United States, and cost a large amount yearly for repairs. The first white man to discover the waters of the Mississippi was De Soto in 1541, and in 1673 Marquette and Joliet descended it nearly to its mouth, while La Salle sailed to the Gulf and took possession of the country for his king in 1682.

Mississippi, University of, the State institution of higher learning, in the State of Mississippi is situated at Oxford, Mississippi. It was granted a charter in 1844, but was not actually set into operation until four years later. An elective system of studies, under the minor restriction of a division into schools, has been in operation since 1872. The degrees granted are those of doctor of philosophy, master of arts, bachelor of arts, bachelor of science, bachelor of mining, bachelor of engineering (either electrical or civil), bachelor of philosophy and bachelor of pedagogy. The total property and endowment of the university is valued at over one million dollars. In 1933, the enrollment was 1,069, with a faculty of sixty-five.

Missolonghi (*mĭs-ō-lŏn′gē*), a seaport town in Greece, built on a swampy flat, is situated in the monarchy of Ætolia, on the northern shore of the Gulf of Patras, twenty-four miles west of Lepanto. The town is memorable for the sieges through which it passed in the struggle for Grecian independence. In 1821-22, under Marco Bozzaris and Mavrocordato, it held out for three months against the Turks. Again, in 1825, it resisted a large force of Turks for ten months; at last, putting the women and children in the center, the garrison cut their way through the Turkish army, 2,000 of them reaching the mountains. Byron joined the Greeks in their struggle at Missolonghi in January, 1824, and died there on April 9, 1824. Statues of Bozzaris and Byron have been erected here. The population, according to the census of 1928, was 9,270.

Missouri (*mĭ-so͞o′rĭ*), one of the central states of the Union, is situated on the western side of the Mississippi. It is 280 miles long, varies from 208 to 312 miles in width and extends over an area of 68,735 square miles, 693 square miles of which are water. It is bounded on the north by Iowa; on the east by the Mississippi which separates Tennessee, Kentucky and Illinois from Missouri; on the south by Arkansas, and on the west by Oklahoma, Kansas and Nebraska. The State is divided into two distinct parts by the Missouri River, which flows 436 miles across the State from Kansas City to St. Louis. The Mississippi River flows for 500 miles on the eastern boundary of the State, the confluence of the two great rivers being at St. Louis, and giving the State almost 1,000 miles of navigable waterways.

Surface. The northern part of the State extending north of the Missouri River is rolling prairie, but more undulating than the plains of Iowa and Illinois, due to glacial action. This is particularly noticeable in the river beds which cut deeply through the valleys. Across the State toward the east and southeast rise the Ozark and St. Francois Mountains, which give Missouri its outstanding scenic beauty. The hills rise to considerable height reaching 1,800 feet on Tom Sauk Mountain. One ridge extending to the southeast has peculiar formations of many bold knobs, as Pilot Knob and Iron Mountain. There are numerous curious caverns many miles long, with hidden lakes and streams and great halls and galleries, adorned with stalactites, and a number of mineral springs. Ha-Ha Tonka cave in Camden County is one of the most beautiful caves in the world, possessing exquisite formations. The springs at Ha-Ha-Tonka are the largest in the Ozark Mountains. The Excelsior Springs attract thousands of visitors for its healthful qualities. Eldorado Springs are particularly noted for their beauty. The extreme southeastern corner of the State is a low lying river area which is swampy and as it extends along the Mississippi River levees have been built to withstand flood waters.

Climate. The climate is marked by extremes, lacking both the moderating influence and protection of the sea air, or the shelter of mountains. To the north, temperate climate prevails, while to the south a sub-tropical climate, temperatures as high as 100 degrees-110 degrees are recorded and twenty degrees-twenty-two degrees at the other extreme. Missouri receives considerable rainfall averaging around forty-one inches at St. Louis.

Minerals. Missouri is rich in mineral deposits centered in the district of the Ozark Mountains. The principal products are lead, zinc, coal, iron, copper, nickel, cobalt, tripoli and baryta, the State leading all others in its production of zinc, lead, tripoli and baryta. The iron fields including Iron Mountain, which covers 500 acres, and Pilot Knob, being almost inexhaustible and supplying very rich ore. Prospectors estimate that 25,000 square miles of coal underlie many counties of Missouri, varying from eighteen inches to five feet in thickness. Large deposits of cannel-coal are found ranging from five to eighty feet in various sections of the State. Zinc is mined in large quantities in the Joplin district in the southwestern portion of the State. Lead is found in great abundance, some of the caverns having millions of pounds on their roofs and sides. The first lead works of America were opened in Missouri and to-day the largest factory in the United States which produces lead is located here. Shale, clay and limestone, the chief minerals in Portland cement, are found in unlimited amounts in Missouri. The clay is also used for fine chinaware and pottery. A narrow strip of land running through eight counties contains a high quality of glass sand.

Production and Industry. Missouri is one of the leading agricultural states of the Union with a great variety of farming, which is due to the variety of soils in the State and the temperate climate of the north and the semi-tropical temperatures in the south. The best farm lands are located in the northern and northwestern sections of the State. Cereals of all kinds are cultivated here with corn yielding the largest crop. More than fifty per cent of the entire acreage of the State is devoted to the cultivation of corn, totalling more than forty per cent of all crops. Wheat ranks second and oats third. The blue grass country of Missouri stretches through the center of the State, where large crops of timothy, hay, rye, potatoes and other vegetables are grown. It is through this section that a superior quality of livestock is raised, making this industry equally important. In 1931 there were in the State 4,011,000 hogs; 2,060,000 cattle; 1,205,000 sheep; 574,000 horses, and 291,000 mules. It has been facetiously said that mules won the war, and Missouri raised and shipped such quantities of these animals to the war zone that the State now leads in exporting them to all states of the Union as well as to foreign countries. Dairy farming is rapidly becoming more important in Missouri. With the raising of 1,228,000 milch cows in 1931, the large output of butter and cheese from produce houses has greatly stimulated this thriving industry. In the agricultural college of the State University, a famous herd of Jersey cattle are raised, judged high in the quality and quantity of butter fat they produce. There are three large stockyard centers in the State, including St. Louis, St. Joseph and Kansas City.

Cotton is grown extensively in the southeastern section of the State. In this same region large crops of sugar, mostly sorghum, and tobacco are raised. A marked increase in the production of these three crops was shown in the decade between 1910 and 1920. In 1932, 396,000 acres produced 285,000 bales of cotton. In the same year 7,175,000 pounds of tobacco were harvested.

Many varieties of fruits are grown in Missouri including blackberries, apples, peaches, pears and plums of northern varieties, and apricots, nectarines and similar fruits which are native to semi-tropical regions.

Seventy per cent of the farms in Missouri are operated by the owners and the average size farm is a trifle over 132 acres. In 1930 farm lands comprised 33,743,091 acres, 15,646,272 acres of which were under cultivation; 14,297,736 acres of pasture, and 1,361,653 acres devoted to other farm uses.

Forests comprise forty per cent of the land in Missouri. The most valuable hard woods are found in the Ozarks. Cedar abounds in the eastern part of the State and cypress in the swamps of the southeast.

Missouri is the largest manufacturing State in the Union. The manufacturing of boots and shoes is the leading industry. In 1930 these factories were valued at $245,523,310. Meat packing is also an important industry. The principal manufactures include flour and feed, mill products, tobacco, lumber, men's clothing, railroad cars, printing, and foundry products.

The coal fields of the State underlie 14,000 square miles of territory. In 1931 3,269,000 short tons of coal were mined; 10,811 tons of zinc, 199,632 tons of lead and 8,030,528 barrels of Portland cement produced. The lead mines yielded 1,800 ounces of silver in 1931. The entire mineral production of the State was valued at $69,074,500 in 1930.

Transportation. Missouri has a greater mileage of river transportation within its boundary than any other State of the Union. This is furnished by the Mississippi River and Missouri River, every mile of which is navigable. Twenty-one trunk lines form the network of 7,970 miles of railroads through the State. The leading railroads are the Missouri Pacific; Chicago, Burlington and Quincy; St. Louis and San Francisco; Chicago and Alton; Wabash, Atchison, Topeka and Santa Fe; and Missouri, Kansas and Texas, with large terminal points at Kansas City and St. Louis. A considerable freight traffic proceeds in and out of these two cities, and the bridge over the Mississippi River at St. Louis is reputed to hold more freight cars than any other in the world. Freight receipts are steadily increasing for river transportation between St. Louis and New Orleans and all intermediary river ports.

St. Louis is also the gateway for tourist travel between the north and south and with the new system of state highways, covering 15,248 miles now under construction, more travellers are attracted to the State each year. The State maintains 9,167 miles of highways, 7,583 miles of which are hard surfaced.

Population. In 1930 the population of Missouri was 3,629,367. An increase of six per cent was shown during the decade, and an average of fifty-two people to the square mile. There were 223,840 Negroes included in this number, amounting to only six per cent of the entire population. Fifty per cent of the population is urban. The most important cities in Missouri with their populations in 1930, are: St. Louis, 821,960; Kansas City, 399,746; St. Joseph, 80,935; Springfield, 57,527; Joplin, 33,454; Hannibal, 22,761; Jefferson, the capital of the State, 21,596, and Sedalia, 20,806.

Both St. Louis and Kansas City were originally fur trading posts, the former founded about 1756 and the latter dates back to 1808. St. Louis was a frontier town for those seeking the southern route on to western country as well as a large river town for travel both north and south of the Mississippi River. Kansas City was an outpost, and the last place of any size where the frontiersmen could stop on their westward routes.

Education. The State has an excellent school system, one-third of the State revenue being devoted to school funds. School attendance is compulsory between the ages of seven and fourteen and separate schools are provided for Negroes. In the school year 1931-32, there were 540,714 pupils enrolled under 18,795 teachers in the elementary schools, and 145,040 pupils under 6,502 teachers in the high schools of the State. The State controls five normal schools enrolling 13,407 students. The expenditures for public schools, including building construction, amounted to $57,289,651 in the school year of 1931-2. The funds are appropriated on the basis of the number of teachers and the attendance, with additional support given to rural schools.

The University of Missouri was founded in 1839 and is the largest institution for higher learning in the State. It is located at Columbia just between Kansas City and St. Louis near the center of the State, with an enrollment of 5,373 students and 396 faculty members in 1932-3. The university includes a college of agriculture, schools of education, engineering, commerce, journalism, medicine, fine arts, and a graduate school. The university maintains several experimental projects—one for the manufacturing of hog cholera serum and another for agricultural purposes. The school of Mines and Metallurgy is located at Rolla on a spacious campus of seventy acres.

Two other educational institutions of note are located in St. Louis, Washington University, founded in 1857 with 3,244 students and 565 instructors in the school year 1932-3, and St. Louis University which was founded in 1818 with 4,050 students and 600 instructors. The former is a non-sectarian institution while the latter is a Roman Catholic school.

Government. The State is governed by a legislature consisting of a House of Representatives and a Senate. There are 150 Representatives elected every two years and thirty-four Senators elected for four-year terms, half of the body retired every two years. The Constitution under which Missouri is governed was adopted in 1875. The State is divided into 114 counties and the City of St. Louis. The Governor is the chief executive, elected for a four-year term, and assisted by a Lieutenant-Governor, Secretary of State, State Auditor, Attorney-General, and Superintendent of public schools, all whom serve for four-year terms. The Treasurer and Governor may serve one term only. The judicial department consists of a supreme court, court of appears, circuit court and inferior courts, with juvenile courts in each county. The State is represented in the National Congress by two Senators and thirteen Representatives.

History. It is believed that De Soto in his travels to the southeast in 1541 explored along the Mississippi River as far south as the present eastern boundary of Missouri. The Jesuit Fathers, Joliet and Marquette from France entered the State along the banks of the river on their journey in 1673. During the years 1681 and 1682 La Salle floated down the Mississippi River and took possession of the valley in the name of France. Several explorers followed him establishing French settlements in the territory which is now included in Missouri. Old Sainte Genevieve is the oldest settlement in the State. It was in 1735 that a few inhabitants made their homes here. Auguste Chouteau and Pierre Laclede Liguest are the founders of St. Louis, established then as a fur trading post. By a secret treaty at Fountainbleau, the French ceded to Spain the land east of the Mississippi River, on December 3, 1762. This territory was included in the Louisiana Purchase which was sold to the United States in 1803 by Napoleon. It was not until the following year, however, that the negotiations were completed for releasing the region now a part of Missouri. The first State capital was St. Louis in 1820. In 1821 it was moved to St. Charles. Since 1826 the State capital has been Jefferson City. One of the most outstanding State capitol buildings in the Union graces Jefferson City. It was completed in 1924 at a cost of $4,215,000.

Missouri became a territory in 1812 but a bitter fight ensued between the North and South before the State was admitted to the Union. The famous Missouri Compromise was the outcome of this political struggle, and slavery was permitted in the State, but excluded in all the rest of the Louisiana Purchase—in the territory north of the southern boundary of Missouri. With the opening of the Civil War a pro-slavery group presented secession resolutions to the Confederacy—but the majority of the State legislature favored the Union, and the State supported the Northern cause. More than 109,000 men joined the Union ranks and it was estimated that 40,000 men joined the Confederate Army.

The State of Missouri is the home of General John J. Pershing, Commander-in-chief of the American troops during the World War; Major-General Enoch H. Crowder, executive of the American Selective Service Act; Admiral R. E. Coontz, Commander of the Navy, and Brigadier-General Edward Russell, Chief Signal Officer in France, all four men distinguished for the services rendered their country in the world conflict.

Missouri, a river of the United States and the longest tributary of the Mississippi is formed by the confluence of the Jefferson, Gallatin and Madison rivers. The name means the "Big Muddy." It is so much larger and longer than the Upper Mississippi that it really should be considered the main river, in which case, with the Lower Mississippi, it would form the longest river in the world. It rises at an elevation of 4,032 feet in the Rocky Mountains, near the border of Montana and Idaho, and flows in a general southeasterly direction to the Mississippi, which it reaches, after crossing the whole State of Missouri, twenty miles above St. Louis. It is 2,945 miles long, 2,300 miles of which are navigable. A narrow gorge made by walls 1,200 feet high and only 450 feet apart, called the "Gates of the Rocky Mountains," through which the river flows, is situated about 400 miles from its source. The Great Falls of four cataracts, separated by rapids, are among the places of scenic interest along the course of the Missouri River.

Missouris, a tribe of Indians belonging to the Dakotah family, first encountered near the Missouri River. They sided with the French against the English in the early struggles for possession of the country. Lewis and Clark found remnants of the Missouris in 1805 on the Platte River, numbering about 300. They had left their home in Missouri and joined the Oto tribe with whom they have since been associated.

Mist. See Fog.

Missouri, The University of, is situated at Columbia, Missouri, where it was founded in 1839. It comprises (1) a graduate department, (2) an academic department, (3) the department of education, (4) law, (5) medicine, (6) military science, (7) agriculture and arts, and (8) mines and metallurgy. The college of agriculture includes the schools of agriculture and engineering and the experiment-station. The University confers degrees of bachelor of arts, bachelor of laws, bachelor of science, doctor of medicine, master of arts, doctor of philosophy, master of science, master of laws and civil, electrical, mechanical, sanitary and mining engineers. This is a co-educational institution. The State at times appropriates additional amounts for particular purposes. In 1932-33, the University had an enrollment of 5,373, and a faculty of 396.

Mistletoe (*mĭs″l-tō*), a parasitic green shrub or herb, which grows upon woody plants and absorbs their sap by means of special sucking organs known as haustoria. There are over twenty genera and 500 species, which are widely distributed but are found most abundant in the tropics. In portions of the south of England the parasite is very common. In winter its evergreen leaves stand out conspicuously from the bare branches of the trees. In the lore of British Druid and ancient German, the mistletoe had prominent place. It was always a ceremonial plant among Europeans. The mistletoe of Europe is *Viscum album;* while the common American mistletoe is *Phoradenron flavescens,* a small, shrubby, brittle form of yellowish color and with white berries, growing in bunches on deciduous trees of various kinds, found from New Jersey southward and westward. The mistletoes which grow in abundance upon various species of conifers, especially in the western mountain regions, are species of arceuthobium which are greenish-yellow and brown, and with small scale-like leaves.

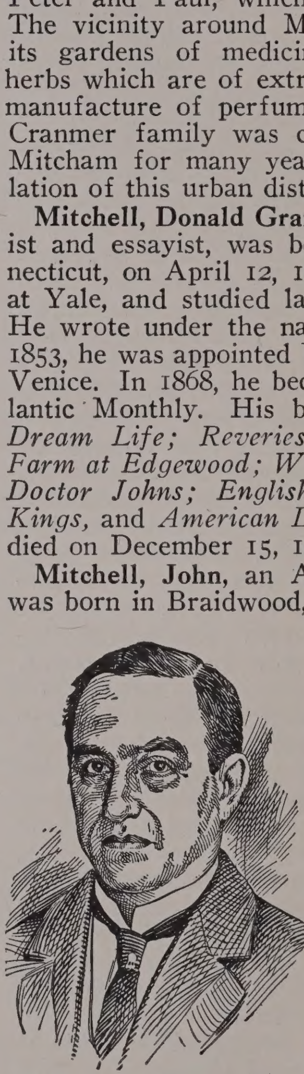
See Haustoria.

Mistral (*mĭs'trăl*), a violent northerly wind which occurs during certain seasons of the year in the Mediterranean provinces of France. These cold, dry and piercing winds blow from the snow-covered plateau of Central France, sweeping down the valley of the Rhone and on to the Gulf of Lyons. Just preceding the onset of a mistral, the usually clear skies sunshine and warm temperature suddenly change. Sudden gusts of wind and a piercing cold soon follow. The mistral soon conquers the local air currents and increases in violence. It is believed that these violent winds are due to the simultaneous existence of a low atmospheric pressure in the Gulf of Lyons and the high pressure area of the north.

Mitcham (*mĭch'ăm*), an urban district of Surrey, England, is situated about eight miles southwest of Victoria Station, London, and nine miles southwest of Westminster Bridge. Here stands the ancient flint church of SS. Peter and Paul, which was rebuilt in 1821. The vicinity around Mitcham is famous for its gardens of medicinal plants and sweet herbs which are of extreme importance in the manufacture of perfumes. The distinguished Cranmer family was closely associated with Mitcham for many years. In 1931 the population of this urban district was 56,856.

Mitchell, Donald Grant, an American novelist and essayist, was born at Norwich, Connecticut, on April 12, 1822. He was educated at Yale, and studied law in New York City. He wrote under the name of Ik Marvel. In 1853, he was appointed United States consul at Venice. In 1868, he became editor of the Atlantic Monthly. His best known works are *Dream Life; Reveries of a Bachelor; My Farm at Edgewood; Wet Days at Edgewood; Doctor Johns; English Lands; Letters and Kings,* and *American Lands and Letters.* He died on December 15, 1908.

Mitchell, John, an American labor leader, was born in Braidwood, Will County, Illinois, on February 4, 1869. His school education was limited to the years between six and ten. At the age of thirteen he began working in the coal mines. When he was sixteen years of age he moved to the western mines, still as a common miner. At that age he was eligible to join the Knights of Labor and did so. He returned to Illinois in 1890. He had studied much at night and had spent one year in the study of law. At this time however, he joined the miners' labor association, and it is there that he felt he received his real education. In 1895 he was elected to the secretary-treasurership of the local district of the United Mineworkers of America. In 1897 he was appointed an organizer, a very important office in those days, when the men had still



John Mitchell

to be taught the advantages of organization. Next year he was elected national vice-president of the order, and was acting president in 1898, when the trouble in the coal regions became acute. From 1899 until 1907 he served as national president of the United Mineworkers, and in that period led the mineworkers through their two great struggles (1900 and 1902) for improved conditions. His judgment and honesty of purpose and his moderation were recognized; and he preserved the sympathy of the public for the striking miners. He was second vice-president of the American Federation of Labor (1900 to 1914). He was a member of the National Civic Federation, serving as chairman of the Trade Agreement department from 1908 to 1911. He died in 1919.

Mitchell, Maria, an American astronomer, was born at Nantucket, Mass., Aug. 1, 1818. She helped her father, who was a teacher, in his work in astronomy, and soon became fitted to make investigations for herself. In 1847 she received a gold medal from the king of Denmark for the discovery of a comet. She was employed in observations connected with the coast survey and in compiling the nautical almanacs. She was the first woman made a member of the American Academy of Arts and Sciences. In 1865 she became professor of astronomy at Vassar College, holding the position until her death at Lynn, Mass., June 28, 1889.

Mitchell, Silas Weir, an American physician and writer, was born at Philadelphia, Pa., Feb. 15, 1829. He studied at the University of Pennsylvania and took his medical degree at Jefferson Medical College. His earliest researches were in the study of poisons, and he became an authority on the venom of snakes. His subsequent work was in the study of diseases of the nerves, and he stood at the head of the profession in that department of medical science. He also published, in connection with others, *Gunshot Wounds and Other Injuries to the Nerves, Injuries to the Nerves and their Consequences* and *Clinical Lectures on Nervous Diseases,* and he made many contributions to medical journals. In another line of literary work he was author of five volumes of poems, grouped in 1896 in *Collected Poems,* and several novels, the more notable of the latter being *Hugh Wynne,* an admirable story of the Revolutionary War, *The Adventures of François;* and *When All the Woods are Green.* Among other stories are *Dr. North and his Friends* and *In War Time.* Among his more popular professional works are *Doctor and Patient* and *Wear and Tear or Hints for the Overworked.* He died Jan. 4, 1914.

Mit′ford, Mary Russell, an English writer, was born in Hampshire, England, Dec. 16, 1787. On her tenth birthday her father bought her a lottery ticket, which drew a prize of $100,000. This money was extravagantly spent, lasting only long enough to give her a good education. She had to write to support the family, and wrote for magazines, and plays for the stage, having earlier published a volume of poems. Her best work was the sketches she wrote of the life around her, which appeared first in the *London Magazine* and were collected in five volumes under the title of *Our Village.* She also published *Recollections of a Literary Life* and *Atherton,* a story, but her fame depends upon the charming sketches. She received a pension from the government, which made her comfortable in her cottage, where she spent the remainder of her life, the center of a large circle of literary friends. She died on Jan. 10, 1855 See *Life and Friendships of Mary Russell Mitford* by L'Estrange.

Mithradates (*mith-rā-dā′tēz*) **the Great,** a king of Pontus (111–63 B. C.), Armenia and Parthia, countries in Asia Minor. He became king when about 13. The first Mithradatic War, as it is called, was against Bithynia, whose king was sustained by the Romans. At first Mithradates conquered the Roman provinces in Asia Minor, but finally he had to make peace, giving up all his Asiatic conquests. In the second war, 83–81 B. C., Mithradates was successful; but he was defeated in the third war (74 to 66 B. C.), Pompey finally driving him to his northern territories. Here he planned revenge, but was prevented from carrying out his purpose by the rebellion of his son, when in desperation he ended his life by suicide in 63 B. C. He was one of the strong eastern despots, well-educated, speaking all the 22 languages in use among his subjects. He made a fine collection of gems, pictures and statues.

Mito′sis. See KARYOKINESIS.

Mityle′ne. See LESBOS.

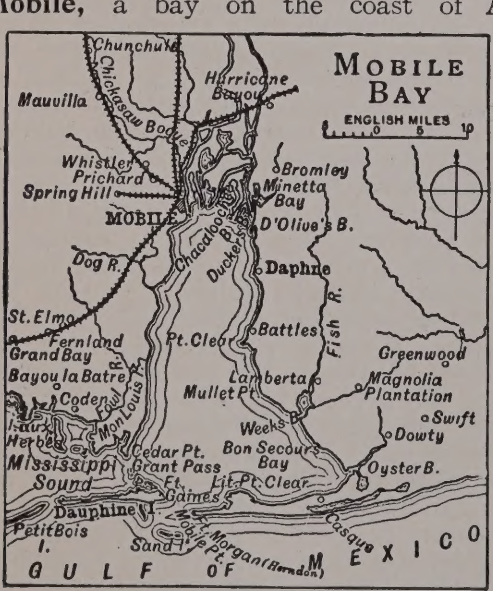
Mivart (*mĭv′ärt*), **St. George,** an English naturalist, was born at London, Nov. 30, 1827, and educated at Kings College. His chief publications were *Genesis of Species, Elementary Anatomy, Man and Apes, Contemporary Evolution, The Cat, Nature and Thought, Types of Animal Life* and *The Origin of Human Reason.* In the main he agreed with Darwin, although working independently of him, and at times he was considered to be radically in opposition to some of the theories of the later Darwinian school.

Mo′abites, a Semitic people who lived in the country east of the Jordan and the Dead Sea, their land being divided by the River Ammon. They were subject to the Jews in the time of David, but revolted about 850 B. C., and joined the Assyrians against the Jews. They are now lost in the Arab tribes of the region. Their country contains many rude stone monuments, such as have been found in the British Isles, supposed to be the altars of their worship. A large stone with an inscription of 34 lines, in Hebrew-Phœnician letters, was found in 1868 among the ruins of the ancient city of Dibon. It was broken by the Arabs, but subsequently was carefully put together and placed in the Louvre at Paris. It is the record of the revolt of Mesha, king of Moab, who is mentioned in 2 *Kings iii*, against the king of Israel. See *Heth and Moab* by Conder and *Records of the Past* by Neubauer.

Moberly (*mō′bĕr-lĭ*), **Mo.,** city, in Randolph County, about 125 miles northwest of St. Louis. The surrounding country is agricultural, and in the vicinity are deposits of fireclay and extensive coal fields. It has flour and lumber mills, brick and lumber yards, a foundry, ice factory and the Wabash Railway's machine-shops. The city has good public and parochial schools, a public library and a Young Men's Christian Association building, and is the seat of St. Mary's Academy. It has the service of two railroads. Population 14,000.

Mobile (*mō-bēl′*), the only seaport of Alabama, is situated on the west side of Mobile River, at the head of Mobile Bay. It is built on a sandy plain rising gradually from the river, with broad streets shaded with live oaks and magnolias. It has a large cotton and timber trade, and manufactures cottonseed oil, chewing gum, cigars and leather. Its public buildings include a city hall, market house, cathedral, fine post office and Spring Hill College (Jesuit). Mobile has successively been a French, English, Spanish and American city. It was the capital of Louisiana under the French until 1723, when New Orleans became the seat of government. In 1763 the lands east of the Mississippi, including Mobile, were ceded to England, but in 1780, were yielded to Spain, which kept possession until 1813. Mobile is a shipping point for cotton and naval stores and is becoming an important commercial center of the satsuma orange and pecan growing industry. Population, 70,000.

Mobile, a bay on the coast of Alabama, about 32 miles long and 8 to 15 wide. The entrance from the Gulf of Mexico is only three miles wide, and is guarded by Fort Morgan and Fort Gaines. It also has an outlet on the southwest, used by small steamers between Mobile and New Orleans. The upper part of the bay is shallow, and is becoming more so all the time from the sediment left by the rivers flowing into it. There are three lighthouses on its shores. One of the great naval battles of the Civil War was fought (Aug. 5, 1864) between Admirals Farragut and Buchanan on the bay.


MOBILE BAY
ENGLISH MILES
0
5
10
Chunchula
Chickasaw Bogue
Hurricane Bayou
Mauvilla
Whistler
Prichard
Spring Hill
MOBILE
Bromley
Minetta Bay
D'Olive's B.
Chacaloochee B.
Duckers B.
Dog R.
Daphne
Fish R.
St. Elmo
Fernland
Grand Bay
Bayou la Batre
Fowl R.
Coden
Mon Louis R.
Pt. Clear
Battles
Greenwood
Lamberta
Mullet Pt.
Magnolia Plantation
Swift
Weeks B.
Dowty
Iaux Herbes
Cedar Pt.
Bon Secours Bay
Mississippi Sound
Grant Pass
Ft. Gaines
Lit. Pt. Clear
Oyster B.
Dauphine I.
Petit Bois I.
Sand I.
Mobile Pt.
Ft. Morgan (Herndon)
Casque
GULF OF MEXICO

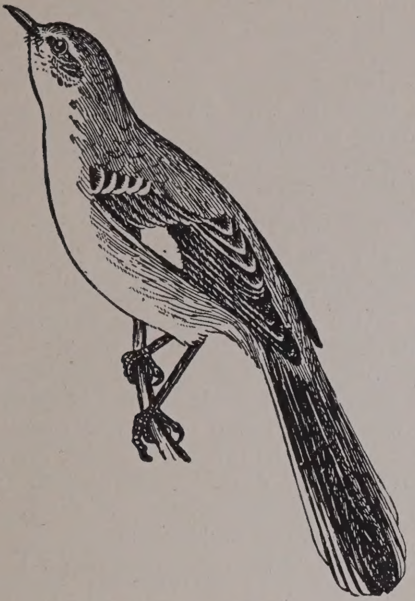
Mobile, a river in the southern part of Alabama, formed by the union of the Alabama and Tombigbee Rivers. The name is that of the Indian tribe living in the region when first settled by whites. The river divides into two branches, the western one taking the name. These two streams, after several more divisions, unite and flow into Mobile Bay. The river is 45 miles long.

Moccasin (*mŏk′kȧ-sĭn*), a very poisonous snake of the southern United States. It belongs to the rattlesnake family, but the tail is short and ends in a horny point instead of a rattle. The water moccasin is the most dreaded snake of the United States. The rattlesnake strikes only when disturbed, and gives warning by its rattle. The moccasin strikes without warning at anything that displeases it. It is an expert swimmer. Often it lies on bushes overhanging streams, watching for frogs and fish. It occurs from North Carolina to southern Illinois and Arkansas and south. Its closest relative is the copperhead or upland moccasin, commonly called the cotton-mouth.

Moccasin, a shoe (Algonquin *mok-i-sin*) worn by the Indians of North America. It is made, sole and upper, of deerskin or other soft leather, and is ornamented on the top with beads of various colors.

Mo′cha. This village lies 130 miles west-northwest of the British port of Aden, in Yemen, Arabia. It is near the site of a large, ancient city (Musa), but it came into importance through the traffic in coffee. No coffee is or was grown near Mocha, but the place for a time was an important market for this product. In 1709 it had 10,000 inhabitants, but in 1806 only 5,000. Now it has dwindled to a mere village, having surrendered most of its commerce to Aden. But its name is still given to a kind of coffee.

Mockingbird (*mŏk′ing-bird*), a singing bird of the thrush family closely related to the catbird. There are several species in South America, the West Indies and the United States. That of the southern United States is best known. It ranges across the country to California and south into Mexico. In the summer it is found in small numbers as far north as Massachusetts, but in the eastern states is not common north of Virginia. It is the most common bird of the south; of sociable disposition, dwelling in town and country garden close to man's dwelling. It is about the length of the robin, has a slender body, long legs and a noticeably long tail; is gray above, the wings and tail brownish tipped with white, in flight the white conspicuous. Incessantly it changes its position, hopping and darting about, up, down and sidewise, often singing as it flashes hither and yon. It is one of our finest songsters, its song a combination of twittering, warbling and chirping; during moonlight nights, while nesting, it sings all night. Its natural song contains many notes similar to those of other birds, though its powers as an imitator have been exaggerated. Besides imitating the sweet tones of the wood-thrush, it whistles, makes sounds like a creaking wheelbarrow, the barking of a dog, the squeak of a hurt chicken. It usually resides where seen and has no fixed migrations. The nest, often built close to the ground, is a loosely constructed affair of leaves, feathers, grass. The speckled green eggs number four or six. Many nestlings are captured and sold as cage-birds. It is said the bird is fast disappearing in portions of the south. See Blanchan's *Bird Neighbors;* Hornaday's *American Natural History;* and Chapman's *Bird Life.*



MOCKINGBIRD

Modena (*mŏ'dă-nȧ*), a city in northern Italy, capital of the province of the same name, 23 miles from Bologna. It is surrounded by walls, which have been made into fine walks. The square tower of the Gothic cathedral, begun in 1099, is one of the great towers of Italy. The palace, built in the 17th century, contains the Este library of 90,000 volumes and a large collection of the works of Guido, Correggio, the Caracci and other Italian masters, among them a reclining figure of Cleopatra by Canova. The university, one of the most famous in Italy, founded in 1678, has an academy of science and art, an observatory, a botanic garden and a military school. It has 45 teachers and 535 students. The trade of Modena is in farming products, and its manufactures are silk, leather, cast metals and vinegar. Modena was an Etruscan city, and was taken by the Gauls, Romans, Goths and Longobards. Constantine the Great destroyed it; Charlemagne made it the capital of a line of counts; and the Este family ruled over it from 1288. The duchy became a part of the Italian kingdom in 1860. Population of the city 70,267.

Modjeska (*mŏd-jĕs'kȧ*), **Helena,** a Polish actress, was born at Cracow, Austria, Oct. 12, 1844. From 1868 to 1876 she was the first actress of Warsaw, where she made the plays of Shakespeare popular. She tried farming in California, but, failing in her enterprise, returned to the stage in 1877 and won a complete success in San Francisco, though she acted in English, a language she had used for only seven months. She was acknowledged to be one of the best of modern actresses, especially as Juliet, Rosalind, Mary Stuart, Camille, Cleopatra and Adrienne Lecouvreur, in which characters she obtained her greatest reputation in the United States and in Great Britain. She died April 8, 1909.

Modocs (*mō'dŏks*), a tribe of American Indians formerly living in northern California, near Lake Klamath. Their houses were pits, roofed with wooden slabs and covered with earth. They had several contests with the white settlers, and finally 41 out of 46 of their warriors were treacherously murdered in 1855 by the whites, when invited guests at a feast. This treachery they never forgot, and became bitter enemies. A part of the tribe, under a chief called Captain Jack, returned to their old home, but were ordered away by the United States troops. They repulsed the troops and retreated to what is known as the lava beds in the mountains, in the fall of 1872, where they defended themselves against repeated efforts to dislodge them until the summer of 1873. Their chiefs were executed, and the rest of band were carried to Indian Territory. Those who had not taken part in the war remained at the Klamath agency.

Moff'at, Robert, a Scottish missionary, was born in East Lothian, Dec. 21, 1795. In 1816 he sailed for South Africa, under the London Missionary Society, and began his work in Great Namaland, in the country of a chief called Afrikaner, who had been a terror to all the region until he came under the influence of Christianity. Moffat opened mission stations, printed the Bible and other books in the native language, and made the whole region a center of Christian light. From 1838 to 1843 he was in England, publishing his *Missionary Labors* and telling crowds of hearers about his adventures and work. He returned with other missionaries, remaining until 1874, when after 54 years of missionary work he once more made England his home, where his labors were honored by a gift of $25,000 and a public reception in London. He died on Aug. 8, 1883. His influence led Livingstone (*q. v.*), whose wife was Mary, the daughter of Robert Moffat, to Africa, and Livingstone in turn won Stanley (*q. v.*) for Africa (1875-90).

Mogul (*mō-gŭl′*). See INDIA.

Mohammed (*mō-hăm′mĕd*) or **Mahomet,** the founder of Islam or the Mohammedan religion, was born at Mecca, Arabia, about 570 A. D. His early life was spent in poverty, partly as a shepherd, until acting in some capacity, perhaps as a camel-driver, in the caravan of a rich widow, Khadija. She, though 15 years older, became his wife. He spent his time after this, while a merchant, largely in lonely meditation. Christianity and Judaism both prevailed in the region, and the ancient Arabian paganism had lost its hold. Missionaries from Arab tribes began preaching at Mecca and Medina, and were the forerunners of Mohammed. His first religious revelation, as he called it, received from the angel Gabriel, when he was 40, was a command to preach a new religion. These revelations were always attended by spasms, something like fits of epilepsy, which were believed by his enemies to be the work of demons. The revelations continued at intervals and were collected and written down after his death, forming the Koran or sacred writings of this religion. His first revelation, when told to his near friends, brought him only ridicule, but at the end of four years he had 40 followers. The command was then given him to come forward publicly as a preacher, which he did, exhorting to a moral life and a belief in one God, whose prophet he was. At first Mohammed was looked upon as a harmless maniac, but as the number of his followers increased and his attacks on the old religion became more severe, the people rose against him. His uncle, though not believing in him, protected him, carrying him to a strong castle where he stayed three years. His whole clan was outlawed and his followers suffered persecution, 100 fleeing to Abyssinia. After his return to Mecca he lost his wife and uncle, and was reduced to poverty. He made several new converts, from Medina, increasing their number with each pilgrimage that was made to Mecca, until, when they numbered 70, he decided to flee to the friendly city of Medina, which he reached in 622 A. D. This flight or Hegira is the beginning of the Mohammedan era. His position was at once changed, and from being a despised maniac he became the ruler of the city and the head of two powerful Arab tribes. His most important act at this time was the giving permission to carry on war against the enemies of the new faith. Victorious in the first battle against the Meccans, adventurers flocked to his standard, and he carried on the war with the Arab tribes successfully, yet with great cruelty. He finally made a ten years' peace with the Meccans, which allowed him to send his missionaries through Arabia, and he soon made his first pilgrimage to Mecca with 2,000 followers. From this time his power increased rapidly. He marched to Mecca with an army of 10,000 men, and was proclaimed chief. Tribe after tribe sent messengers to do homage to him either as the Prophet of God or the prince of Arabia.

His last pilgrimage to Mecca was made in A. D. 632, the tenth year of the Hegira, and at that time he ordered the ceremonies of the great pilgrimages, which are still observed. His last sickness occurred in the house of his favorite wife Ayesha, who was but one of many whom he married after the death of Khadija. He called for writing materials, probably to indicate his successor, but Omar, his most influential friend, prevented their being given him, fearing he would appoint Ali, while he himself wanted Abu Bekr. Mohammed died at Medina, June 8, 632. Abu Bekr said to the gathered crowd, who would not believe in his death: "Whoever among you has served Mohammed, let him know that Mohammed is dead; but he who has served the God of Mohammed let him continue in His service, for He is still alive and never dies." The tomb of Mohammed, in the house where he died, is now part of the mosque at Medina.

The religion of Mohammed recognized the one God, the creator of all things; Adam, Noah, Abraham, Moses, Jesus and Mohammed as successive prophets, who proclaimed new laws which did away with all that had gone before; the resurrection from the dead; a final judgment; and future rewards or punishments. It commanded prayer, almsgiving, fasting and pilgrimages. It forbade the drinking of wine, all games of chance, the use of blood of swine or animals dying from disease as food; and the worship of idols. It allows polygamy, though limiting the number of wives to four. Every Mohammedan prays five times a day, and the hour for prayer, called by the muezzin, is announced by this officer, from the minarets of the mosques. When praying their faces are turned toward Mecca. The Koran (*q. v.*), the sacred book of the Mohammedans, is made up of the "revelations" made to Mohammed, which he had written down, but which were not collected until after his death. It comprises some 114 chapters, and the contents are drawn from the ancient Arab traditions, the Old and New Testaments, the Talmud of the Jews and later writings. Eighty years after the death of Mohammed, Islam, as the Mohammedans call their religion, ruled in Arabia, Syria, Persia, Egypt, North Africa and Spain. Two hundred millions of the human race embrace it to-day. Its conquests in modern times have been in Africa, but its power has declined in other countries. See *Mahomet* by Washington Irving and *Life of Mahomet* and *Mahomet and Islam* by Sir W. Muir.

Mohammed or **Mehemet Ali** (*mā′he-mĕt ä′lē*), viceroy of Egypt, was born at Kavala, Macedonia, in 1769. He served in the Turkish army in the war against the French in

Egypt, and became one of the most popular of military leaders. After the French were driven out, he fought with the Turks against the Mamelukes, and finally was made pasha or chief ruler by the people of Cairo and confirmed in his power by the sultan of Turkey. After many contests with the Mamelukes, aided during part of the time by the British, he in 1811 enticed a large number into Cairo and treacherously murdered 470 of his guests, following it by a general massacre of the Mamelukes throughout the country. In 1816 he conquered part of Arabia, in 1820 Nubia and part of Sudan. His armies, under his son Ibrahim (*q. v.*), invaded Syria, which Turkey ceded to Egypt on condition of tribute. His conquests were checked when within six days' march of Constantinople, by the allied forces of the European powers. In 1840 he was compelled by Great Britain, Russia, Austria and Prussia to accept terms of peace, by which Egypt was secured to him and his descendants on condition of yielding Syria to the sultan and paying tribute. He introduced many modern improvements into Egypt, maintained a standing army, and increased irrigation, the cultivation of cotton and manufactures. He died at Cairo, Aug. 2, 1849.

Moha've Desert. This desert region lies in southern California, a triangle bounded to the east by Mohave River and to the south by the San Bernardino Mountains. It is northeast of Los Angeles, and includes parts of San Bernardino, Los Angeles and Kern Counties

Mo'hawks, American Indians, one of the Five Nations or Iroquois They were friends of the Dutch in New York and afterwards of the English, and during the French and English wars they did good service in Canada. In the Revolutionary War, under Brant, they fought with the English and massacred American settlers. Since 1784 they have been settled in Upper Canada (Ontario). See *History of the Five Indian Nations* by Colden and *Brant and Red Jacket* by Eggleston and Seelye.

Mohawk Valley. This valley, which is over 100 miles in length, is traversed by the Mohawk, a fine stream which joins the Hudson at Cohoes. The valley, which is a natural route between New York and the Great Lakes, was the scene of some of the chief campaigns of the War of Independence. It is a rich and prosperous agricultural district, noted for its smiling beauty.

Mohicans (*mō-hē'kanz*) or **Mohegans** (*mō-hē'ganz*), a tribe of Indians belonging to the Algonquin family, who were living on the Hudson when its valley was settled by the Dutch. They fled to Connecticut, being driven there by the Mohawks. They joined the English against the French, but during the Revolution sided with the Americans. They have since been scattered, some settling at Oneida, N. Y., some moving to Wisconsin, and a small remnant going to Kansas. They have mostly given up their language, and have become citizens. The name has been made famous by Cooper's novel, *The Last of the Mohicans.* See *Indian Mission at Stockbridge* by Jones and *Indian History for Young Folks* by Drake.

Moldau (*mŏl'dou*), the principal river in Bohemia, rises 3,870 feet above the sea, in the southwestern part of the country, and flows first southeast and then north, until, after 278 miles, it joins the Elbe about 20 miles north of Prague.

Molda'via. See RUMANIA.

Mole, a small burrowing animal with pointed head, no neck, very large, spade-like front feet, short front legs and thick clumsy body. The front paws are broad and stout and well-fitted for digging, the nose for boring and pushing. Moles are covered with a dense, velvety fur of a dark color. As they lead an underground life, their eyes are minute or rudimentary and often covered with skin. They have no external ear. They are found both in the Old and the New World in the northern hemisphere. The common English mole disfigures lawns, pastures and gardens extensively by the ridges and furrows it makes hunting after food, but, as it feeds on injurious larvæ and insects, it compensates for the damage. The European mole lives in a colony, in a fortress that is complicated. In little hillocks of earth, called molehills, there is constructed a central chamber, surrounded by two ring-like galleries, one above the other. These circular galleries are connected by vertical passages, and the upper one has five openings into the central cavity. From the lower gallery about nine alleys lead off in different directions toward the feeding-grounds. They feed mainly on earthworms, and also eat insects, larvæ and field mice Occasionally, on fine summer nights they issue from their burrows. They are great sleepers as well as great and rapid workers Our American species are all small, and have very soft, silky fur. Our common mole is about six and one half inches long, has glossy hair of varying shades of gray, sometimes of a rusty tinge. Its range is southern Canada and the lowlands of the eastern United States down to Florida, common in dry meadow lands. The hairy-tailed mole (Brewer's mole) belongs distinctly to the north. The star-nosed mole spends much time about the water, tunnels along brook and pond and in swampy soil, can swim under water as well as on the surface. To the prairie country belongs the prairie or silver mole. Moles are invaluable to the farmer, waging war on insect life in the soil; though often accused by him of stealing his cornseed and vegetables.

Mole-Cricket. See CRICKET.

Molecule (*mŏl'ē-kūl*) is a word which is employed in science with two rather different meanings. Experiment has shown that matter is not continuous, but is probably made up of very small particles. Accordingly the chemist uses the word *molecule* with considerable accuracy to mean the smallest portion of any kind of matter which can exist alone and yet preserve the properties of this particular kind of matter. Thus the smallest portion of table salt which can exhibit the properties of table salt must contain still smaller parts of sodium and of chlorine. These smaller particles of which the molecule is made up are called *atoms* (*q. v.*). But even when a body is made up of atoms of one kind, these atoms rarely remain uncombined, but unite with each other to form molecules. Thus hydrogen gas is composed of molecules made up of two atoms of hydrogen. Remsen distinguishes between molecules and atoms as follows: "Atoms are the indivisible constituents of molecules. They are the smallest particles of the elements that take part in the chemical reactions, and are, for the greater part, incapable of existence in the free state, being generally found in combination with other atoms, either of the same kind or of different kinds." In chemistry the molecule of a compound consists of atoms of a different kind, while the molecule of an element consists of atoms of the same kind.

In physics the word *molecule* is used more loosely, often, to mean the smallest particle of a substance with which we are dealing, whether it be made up of one or more atoms and whether these atoms be of the same or of different kinds. Thus there is reason for thinking that the diameter of a hydrogen molecule is something like 5.8×10^{-8} centimeters, while the diameter of a carbon dioxide molecule is larger, namely, 9.3×10^{-8} centimeters. Molecule is used in this sense in the classical illustration given by Lord Kelvin, that a drop of water magnified to appear the size of the earth would be made up of molecules about the size of cricket balls. Too little is yet known about molecules even to define exactly what is meant by "the size of a molecule." See ATOM.

HENRY CREW.

Molière (*mô'lyâr'*), **Jean Baptiste Poquelin,** a French dramatist, was born at Paris, Jan. 15, 1622. His father's name was Poquelin, the name Molière being taken for the stage. He began as a theater manager, failing in Paris but succeeding in the provinces, returning to Paris in 1658, where he organized a regular theater. He wrote several of his comedies while traveling through the country with his theatrical troupe. He depended largely for his tragedies, as a theater manager, on Corneille and Racine, and in his comedies and farces he borrowed from Spanish and Italian literature, owing to the haste with which many of them were written. From 1659, when the first of his great comedies appeared, until 1673 not a year passed without adding one at least to these immortal works. He attacked with his satire religious hypocrisy, in *Tartuffe*, which in consequence was forbidden the stage for five years; the vanity and follies of women; the frivolity of the nobles; and the pretensions of the learned classes, especially the doctors His wit, satire and power over language place him in the highest rank of French writers; and his plays have held the stage for 250 years. His greatest works are *The School for Wives, The Misanthrope, Tartuffe, The School for Husbands, The Physician in Spite of Himself, The Imaginary Invalid* and *Learned Women.* He died at Paris, Feb. 17, 1673. A century after his death his bust was admitted to the French Academy, which had never received him as a member because he would not give up his profession.

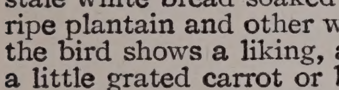
Moline (*mô-lēn'*), a city of Illinois, in Rock Island County, on the Mississippi, 179 miles west of Chicago. It is separated from Rock Island by a narrow channel, which is used as a water-power. It is a manufacturing city, with numerous mills and factories. Population 36,000. See DAVENPORT and ROCK ISLAND.

Mol'lusks, a subkingdom of animals with a soft body, as snails, clams and others. The body is not jointed as in the earthworm and crayfish Mollusks usually possess a shell, but there are some naked forms. They live on land and in water, both fresh and salt. Some mollusks have a larval form, similar to that of some worms, and this serves to connect the two groups The group is a large one, and is divided into classes as follows: (1) *Gasteropoda*, those like snails, crawling on a broad, fleshy foot. The class contains common snails, slugs and many seashells, like whelks. (See SNAIL and LIMPET.) Land snails, feeding on plants in damp districts, are common in many sections of the United States and other countries. In the Philippines are many tree-snails. Pond snails are abundant in still water; there are flattened forms, long, sharp-pointed ones and others showing gradations between the two. (2) *Lamellibranchiata*, mollusks with gills like plates or lamellæ, represented by clams, oysters and mussels (which see). Their shells have two valves, and they therefore are called bivalves. (3) *Cephalopoda*, mollusks with processes called arms or feet clustered around the head, and therefore named the headfooted. The arms are provided with sucking disks. (See CUTTLEFISH, SQUID, NAUTILUS.) (4) *Amphineura*, containing the chitons, and (5) *Scaphopoda*, represented by the elephant tooth shell, are two classes of less popular interest. The mollusks are represented by 20,000 living and 19,000 fossil species. See Woodward's *Manual of the Mollusca.*

Molly Maguires (*mol'i-ma-gwirz'*), an Irish secret society which existed from 1867 to 1877 in the coal regions of Pennsylvania. The name came from Ireland, where a band of "ribbon men," disguised as women, carried on their outrages by night. The society in Pennsylvania attempted to obtain political power by a system of terror, committing murders when opposed. A number of the leaders were convicted and executed by the aid of a detective who for three years acted as the secretary of one of the branches of the society.

Mol′ting or **Ecdysis,** the periodic shedding of the skin or its appendages. Under this are included loss of plumage among birds; shedding of hair and horns among animals; and casting of the skin in the lower animal life. Throughout the year among birds there is more or less loss of feathers, but a noticeable molt takes place once or twice a year. Generally the loss of feathers is accomplished gradually, renewal about equalizing loss; but some birds are handicapped by the molt, become quite bare, scarcely able to fly. Wild birds molt during the season of an abundance of food, and during this period birds need a variety and quantity of food. Pet birds often droop at molting time from want of care. The following is recommended for them: a little hemp-seed, some stale white bread soaked in water, partially ripe plantain and other weed-seed for which the bird shows a liking, a bit of fresh fruit, a little grated carrot or beet, while a marigold flower may be placed between the bars for the bird to pick at. An egg-paste is relished, which is made by adding cracker-crumbs and seasoning of cayenne pepper to a grated, hard-boiled egg. For care of birds in molting see Page's *Feathered Pets*.

Moltke (*mōlt′ke*), **Hellmuth, Count von,** a distinguished German field-marshal, was born, Oct. 26, 1800 at Mecklenburg-Schwerin. His father being a Danish officer, he was sent to a military school at Copenhagen and entered the Danish army as a lieutenant, but left it for the Prussian service. He spent considerable time in the study of military tactics and foreign languages, and was appointed on the staff of Prince Frederick William. He was chief of the general staff of the army in Berlin from 1858 to 1888, and reorganized the Prussian army. He also made plans for coast defenses and the creation of a navy. His great powers as a military leader were shown in the wars with Denmark in 1863, with Austria in 1866 and with France in 1870. He was called The Silent, from his great modesty and reserve. He wrote *Letters from Turkey, The Campaign in Turkey, The Italian Campaign of* 1859 and *Letters from Russia*, while the *History of the German and French War*, by the general staff, was written under his direction and much of it by him. He died at Berlin, April 24, 1891. See *Life* by Müller, translated by Pinkerton.



COUNT VON MOLTKE

Moluccas (*mō-lŭk′ȧz*), called also **Spice Islands,** a division of the Malay Archipelago or Dutch East Indies. It includes most of the islands between Celebes and New Guinea, east and west, and between Timor and the Philippines, north and south. It is divided into the northern and the southern Moluccas. The northern group runs from north to south, is surrounded by deep water, includes ten or 12 large islands with smaller ones, and has a population of about 60,000. The largest island is Jilolo, while the smaller islands of Tidor and Ternate have been the most important ones. They were occupied by civilized tribes of Malays, who ruled the ruder tribes on the surrounding islands, and later were the seats of powerful Mohammedan sultans; and now, as the seat of the Dutch government or residency, Ternate has most of the trade of the northern Moluccas, exporting spices, tortoise shell, beeswax and birds of paradise. The southern Moluccas are separated from the northern group by a very deep ocean chasm, and are connected by a shallow ocean bed. There are two large islands, three or four smaller ones and several clusters of small ones, covering about 43,864 square miles, and having a population of 410,190. Amboyna, the capital of the Dutch possessions, carries on a large trade in cloves, 500,000 pounds being raised in some seasons in the clove gardens of the government. Banda, the third Dutch residency, is the home of the nutmeg, which grows on the slopes of the volcanic islands. Besides nutmeg and mace, it also exports sago and cocoanuts. The region of the Moluccas is volcanic, and there are several still active volcanoes, from one of which, Api in Banda, there was a terrible eruption in 1825. The climate is tempered by the ocean breezes and by the height of the islands, some of them rising 8,000 or 10,000 feet above the sea. The animals are curious. They are the flying opossum, the bird of paradise, the mound-building bird, the long-armed beetle, most gorgeous butterflies and beautiful sea anemones, shells and corals.

Mommsen (*mŏm′zen*), **Theodor,** a German historian, was born at Garding, Schleswig, Nov. 30, 1817. He spent three years traveling in France and Italy and studying Roman inscriptions, edited a newspaper in Schleswig, and held a professor's chair at Leipsic, that of Roman law at Zurich and the same professorship at Breslau and that of ancient history at Berlin. His large library was burned in 1880, and a new one was presented him by his English students. He edited, with others, several historical works, and wrote a number on Roman law, Roman coins and kindred subjects, making him famous as one of the greatest scholars of the age. His great work, *The History of Rome* (to B. C. 45), has passed through many editions, and been translated into French and English. It was supplemented by a history of the Roman provinces and by another on Roman constitutional law. Bryans and Hendy abridged it admirably for schoolboys. From 1873 to 1882 he was a member of the Prussian chamber of deputies, when he acted with the national Liberals. He died on Nov. 1, 1903.

Monaco (*mŏn'ȧ-kō*), a small principality on the Mediterranean, nine miles from Nice. It covers eight square miles, and consists of a rocky promontory, on which the city is built, and a small strip of coast. Here, within the petty state, is the great gambling town and casino of Monte Carlo (*q. v.*). It has belonged to the Grimaldi family for over 900 years. They have several times put their country under French protection, and in 1859 the whole region belonged for a short time to Victor Emmanuel. The owner at another time sold a part of his dominions, including Mentone, to Napoleon III for $200,000. His capital is now under French protection. The climate is mild, and palms, aloes and other southern plants abound. Population of the entire principality 15,180, the town of Monaco having 3,292 and Monte Carlo 3,794.

Mon'asteries, literally, are dwellings in which persons live alone. The name is usually applied to the homes of companies of monks; but is often extended to the dwellings of less rigid and ancient clerical orders than those of monks properly so called. The idea of the monastery developed out of the older idea of the sanctity of a religious life led in the solitude of the desert, which may be traced back to the cell of Paul, the first hermit (250 A. D.). Monasteries have played a most important part in history, especially as centers for the transmission of learning and civilization. In such countries as Saxon England the monks not only taught Latin and the arts of the Romans, but improved methods of agriculture and modes of living. In the middle ages they took on themselves the function of schools, especially for children of gentle birth. They gained very extensive lands, which were exempt from the feudal dues. Their success in this direction made the monasteries an object of jealousy and cupidity to the nobles; and one finds their property in England confiscated under Henry VIII. Similar confiscations took place all over Europe in connection with the property of the Knights of the Temple. In general, monasteries are classed as belonging either to monks, friars, military orders, regular canons or regular clerks. The most important order of monks was the Benedictines, who acted as the chief educative and missionary force in the medieval church, though in postreformation days they were surpassed in these respects by the famous order of Jesuits. Monasteries express an ascetic ideal of life which is not in harmony with modern thought; and the recent attacks upon them in France are only the culmination of a movement which included the suppression of the Jesuits and the blows struck at the religious orders by Joseph II of Austria. But the freedom allowed in America to religious orders has in this country led to a rapid increase in the number of inmates of monasteries, of whom there are now said to be about 9,000 men and 50,000 women.

Monastir (*mŏn-as-tēr'*), also called **Bitolia,** the second city in Turkish Macedonia, is situated in a broad mountain valley, 90 miles northwest of Salonica. It manufactures carpets and silver filigree, and trades in corn and other farm products. The Turks have made it the head of an army corps, as it is an important military point. Its ancient Greek name was Pelagonia. The Albanian beys were massacred here in 1833. Population 45,000. Monastir also is a province in European Turkey; area 11,000 square miles, population 848,900.

Moncton (*mŭnk'tŭn*), a city in New Brunswick. The Intercolonial Railway system is centralized here, and here, too, are its workshops. Population 9,000.

Mon'ey is the name given to those substances which are used to facilitate commercial exchanges and to serve as a measure of values. Nearly all metals have been so used at some time or by some nation, but gold and silver have been found the most convenient and stable for general purposes. Among savage races beads, shells and even less valuable substances have been accepted as money, and among all civilized nations certificates of indebtedness have frequently taken its place. The value of money is, in a measure, fixed like other values by the law of supply and demand; the supply being the amount in circulation at the time and in the community in question; and the demand being the amount of commercial transactions carried on for which money is needed. But into the problem so many other elements enter, that no simple theory can be made at any time to account for all the phenomena. The use of money raises commercial transactions from mere barter to a different and higher plane. If the world had no money, the would-be seller could only sell as he might find some one with a desire also to sell some article of his own, which the first at the same time desired to obtain. But by the use of money anything can be sold or anything can be bought, at any time, by persons having the money to facilitate the transactions. The supply of gold being limited and its uses manifold, it has always been held at a much higher ratio of value than other metals, how much higher depending upon the output of the mines and the extent of the transactions requiring its use. In deals involving millions of dollars it would seem necessary to have some form of money in which the large sum might be easily transferred. In olden times money was issued by private individuals, but, in order to insure inspection and to inspire confidence, this duty and privilege has now been assumed by the state. In some countries a charge is made by the government for transforming bullion into coin; in others the metal is converted into money without expense to the owner, upon the ground that the cost is small and the benefits accruing to the state, by means of the increase of the stock of money, great.

Mongo′lia, a territory of the Chinese empire, situated south of Siberia and north of China proper, west of Manchuria and east of eastern Turkestan. It in the main is a wide waste, comprising the great desert of Gobi. Its area is 1,367,600 square miles, with an estimated population of 5,000,000. (CHINA). Although the country is for the most part a desert, northwestern Mongolia is well watered and furnishes pasture for the flocks and herds. The rain bearing winds are from the northeast. Those from the south, though originally containing more moisture, are sucked dry by the hot and thirsty desert over which they pass; consequently the forests, having so little moisture to sustain them, disappear as one travels south. "The Gobi," although portions of it have been described by travelers ever since the days of Marco Polo (*q. v.*) is still imperfectly known. In places, for hundreds of miles, there is nothing to be seen, but plains of yellow sand which the Mongols call "the sky" because you can't tell where the sands end and the sky begins.

Mongols (*mŏṉ′gŏlz*), an Asiatic race, constituting one of the large divisions of mankind, including the Mongols proper (known as East Mongols and West Mongols and Bariats) and the Tartars, who form a distinct branch. The Kalmucks belong to the West Mongols. Mongolia, inhabited by the East Mongols, is a part of the Chinese empire, lying south of Siberia and shut in by mountain ranges. The people lead a wandering life, dwelling in tents and having flocks of sheep and herds of horses, cattle, camels and goats. They are mostly Buddhists in religion, and fond of making long pilgrimages. There are about 5,000,000 of them under Chinese rule. The Western Mongols have mingled with their Turkish neighbors so that it is difficult to number them. They are found in Russia, Astrakhan, Turkestan, Bokhara, Samarcand and the Crimea. The history of the Mongols begins with Genghis Khan (*q. v.*), born about 1160, who united the different tribes into one nation and led them to conquest. They overran Tartary, a large part of China, Persia, Russia and Afghanistan. Under his sons and their successors other portions of China were conquered, the caliphs of Bagdad overthrown, and Europe invaded as far as the Danube, making the Mongol empire, at its height, the greatest the world has known. Kublai Khan (*q. v.*), the grandson of Genghis Khan, established the first Mongol dynasty in China, which was finally overthrown by the Chinese in the 14th century. The Mongol kingdom, divided in the 13th century, was united again in the 14th century under Tamerlane (*q. v.*), but after his death lost its power, until in the 17th century it became a part of the Chinese Empire. The Mongolian language belongs to what is called the Turanian family. There is very little extant literature, what they possess being mostly translations from Chinese religious works. The original works mainly are accounts of the deeds of Genghis Khan and Tamerlane. See *History of the Mongols* by Curtin and that by Howorth and *Among the Mongols* by Gilmour.

Mon′ism. The philosophic view that regards all substances as derived from one fundamental substance is known as monism. Materialism holds that substance to be physical, mind being regarded as a special sort of matter. Idealism considers all existence, material as well as psychical, as ultimately reducible to mind. The natural assumption that mind and matter are independent substances is dualism. Monism, however, is more satisfactory as a logical system, since dualism usually involves the contradictory assumption that independent realities may yet influence or be dependent upon each other. Pluralism holds that existence consists of a number of independent substances. It, too, is compelled to face the contradiction between the independence of these substances and the fact of experience that interaction seems universal. Analysis in revealing the law of interaction among things seems to have discovered a monistic principle or law superior to the things that it governs or connects. This would make monism inevitable. Even the agnostics, who declare that the supreme reality is unknowable, usually assume that it is unitary, thus becoming monists by implication. Consult Paulsen's *Introduction to Philosophy*.

Mon′itor, a kind of warship first used in the Civil War. It was a wooden ship covered with plates of iron, carrying in the center a revolving tower or turret, in which the guns were placed. The first one used was made by Captain Ericsson (*q. v.*) in 100 days, and was engaged in the naval battle with the Confederate ship *Virginia* or *Merrimac*. The success of the *Monitor* produced great excitement in Europe and made a revolution in the construction of naval vessels. England immediately experimented with this style of warship, changing a wooden vessel into an ironclad monitor, which was considered the most formidable ship in the navy

Improvements were made from time to time, until the greater part of naval vessels are now made upon this principle and known as monitors or ironclads. See Navy and Timby, T. T.

Monk (*mŭnk*) or **Monck, George,** Duke of Albemarle, an English general, was born in Devonshire, Dec. 6, 1608. His first military services, at Cadiz and the Isle of Rhé, consisted of nine years in Holland and in wars against the Scotch and the Irish. This period ended in 1644, when he was taken prisoner by Fairfax and kept in the Tower of London for two years. He was freed by agreeing to the Covenant. He was major-general at Ulster, and Cromwell left him to finish the conquest of Scotland, and in 1654 he was appointed governor of the country, a position he filled well for five years. At the death of Cromwell, while everything was in confusion, he marched to London with 6,000 men, and entered the city without opposition in February, 1660. Every party wanted him, and felt that the fate of the country lay with "Old George." His own wish was to bring back the Stuarts, and he found the nation with him. He brought about the election of a new parliament; and on May 23, 1660, he welcomed Charles II at Dover. He was rewarded with high offices and made duke, but soon retired from political life. See the *Life* by Guizot and that by Corbett.

Monkey (*mŭn'kȳ*), a word loosely applied to apes, baboons, Old and New World monkeys, marmosets and lemurs. Here it is, for convenience, restricted to the smaller forms living on trees and usually having long tails. This separates them from the baboons and higher apes on the one hand and the lower lemurs on the other, all of which are noticed alphabetically. The New World monkeys have nostrils wide apart (*Platyrrhini*), and most of them have long tails for grasping. They inhabit the forests traversed by the Amazon and the Orinoco, and extend north to Panama. Ten species live north of this in Central America, and one — the spider monkey — extends its range into Mexico. The howling monkeys have a resonance chamber at the top of the windpipe, and night and morning they make the forests resound with their hideous howling. They cannot be tamed. The monkeys usually seen in captivity, from South America are marmosets and monkeys of the genus *Cebus*. The marmosets are the smallest monkeys, not much larger than squirrels, and usually are made a separate group. The spider monkeys have slender bodies, long, angular limbs and very long tails, which are used as a fifth hand. The Old World monkeys are entirely distinct. Their nostrils are close together (*Catarrhini*) and the tail, when present, is not used for grasping. The macques, inhabiting India, Tibet, the Malay Archipelago and the Philippines, are often seen in menageries. Throughout Africa are found numerous troops of monkeys with slender bodies like the green monkey. They live on trees and have long tails. The *Catarrhini* include baboons and higher apes, but these are treated separately. See Ape, Baboon, Lemur and Marmoset.

Monks'hood or **Aconite,** a flower whose calyx is shaped strangely like a monk's hood, color of flower a blue-purple. It is a member of the crowfoot family. The flowers hang from the top of slender, bending stems, these sometimes climbing. The leaves have three to five-lobed petioles, and are coarsely toothed. The plant seeks the banks of small streams, is a native of Virginia, is found as far northward as New Jersey, and blooms all summer, sometimes into September. It is known also as wolf's bane, the root containing a virulent poison.

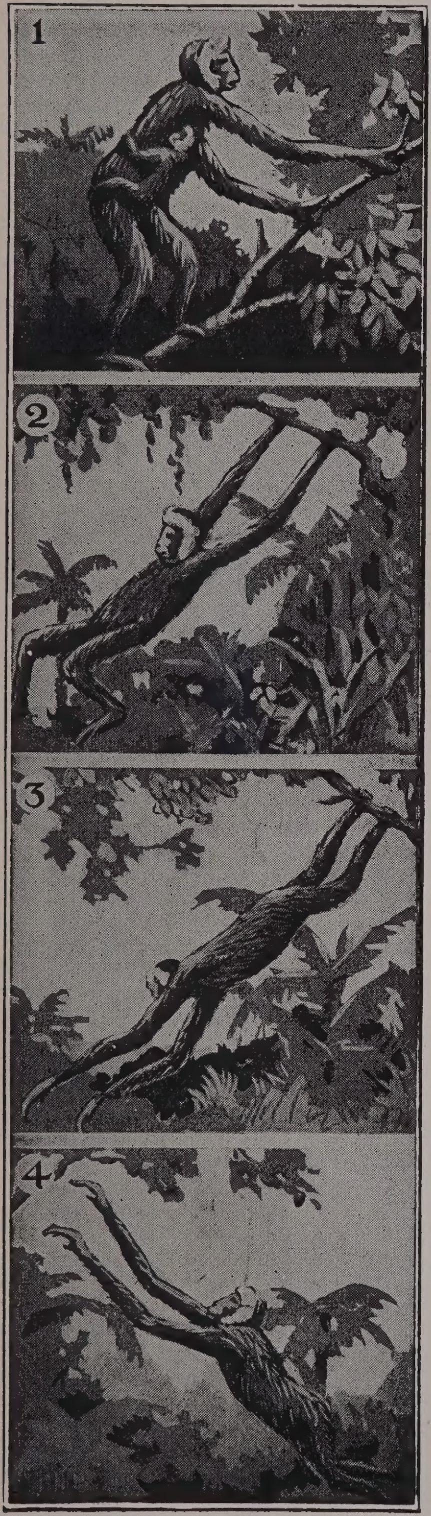
Mon'mouth, Battle of, an engagement between the English forces under Clinton and the American forces under Washington at Freehold, Monmouth County, N. J. It was Washington's first battle after the terrible winter at Valley Forge. It was fought on June 29, 1778. General Charles Lee was in charge of the advance, which was thrown into confusion and began a retreat. Washington hurried to the front, reproving Lee sharply, and rallied the fugitives. Tradition says that this was the only time that Washington was known to swear. The Americans held their ground, and Clinton retreated in the night. Lee was deprived of his command for a year by court-martial.

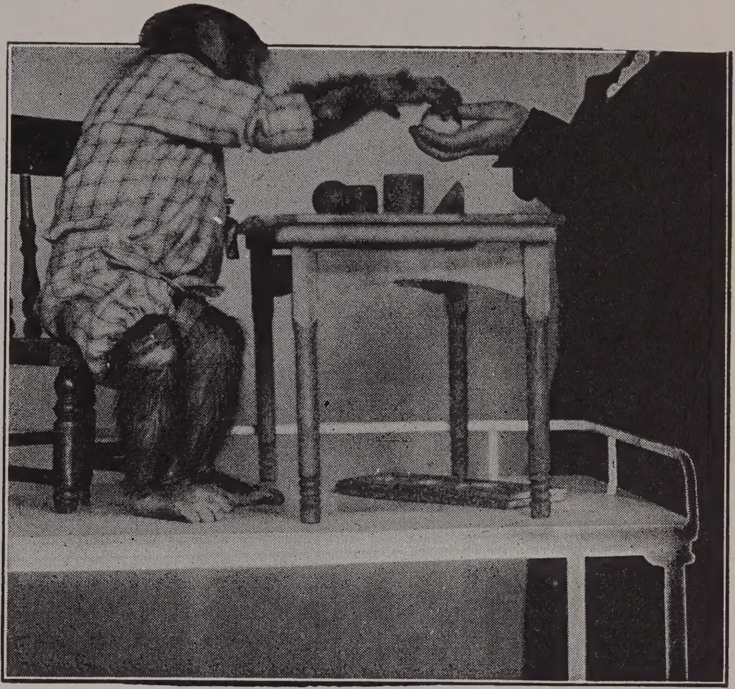
Mon'mouth, James, Duke of, was born at Rotterdam, Holland, April 9, 1649. He was thought to be a son of Charles II, and as such was made duke of Monmouth and wedded to a rich heiress. In spite of his profligacy he became the idol of the people, thanks to his beauty and winning manners, his royal tours through the country and his humanity toward the Scotch Covenanters at Bothwell Bridge in 1679. His share in what is known as the Rye House Plot in 1683 was discovered, and he fled to Holland. After the death of Charles he returned to England on June 11, 1685. He claimed the throne, attacked the king as a murderer and Catholic, and had himself proclaimed as James II. Gathering about 3,000 men, mostly peasants and miners, he risked a battle with the king's troops at Sedgemoor in Somerset. He was defeated, losing nearly half his army, and was captured when fleeing, disguised as a shepherd. His tears and pleadings and even the promise to change his religion were of no avail with the king, and he was beheaded at London, July 15, 1685. See *Life* by Roberts.

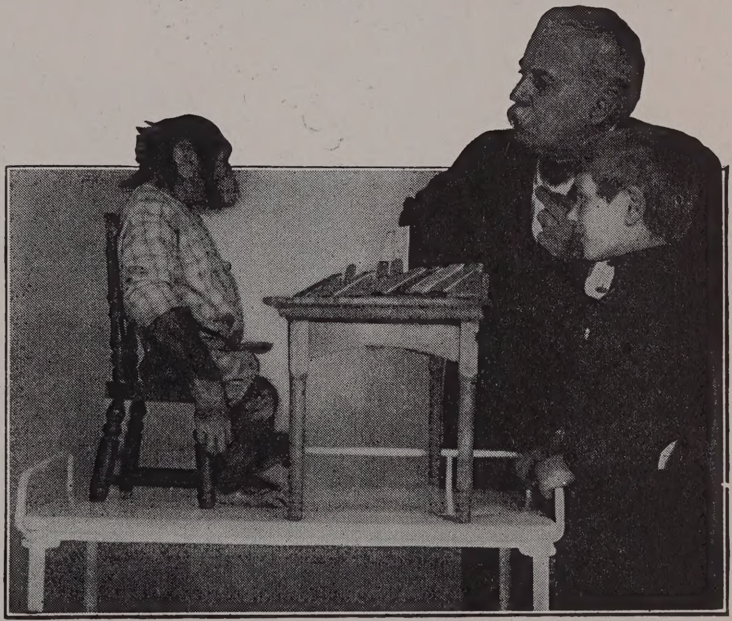
Monocotyledons (*mŏn'ō-kŏt'ĭ-lē'dŭnz*), plants forming one of the two great groups of angiosperms, containing about 25,000 recognized species. The name comes from the fact that the embryo develops a single cotyledon. The other features which distinguish the group in general are the structure of the

HOW CLEVER THESE MONKEYS ARE!

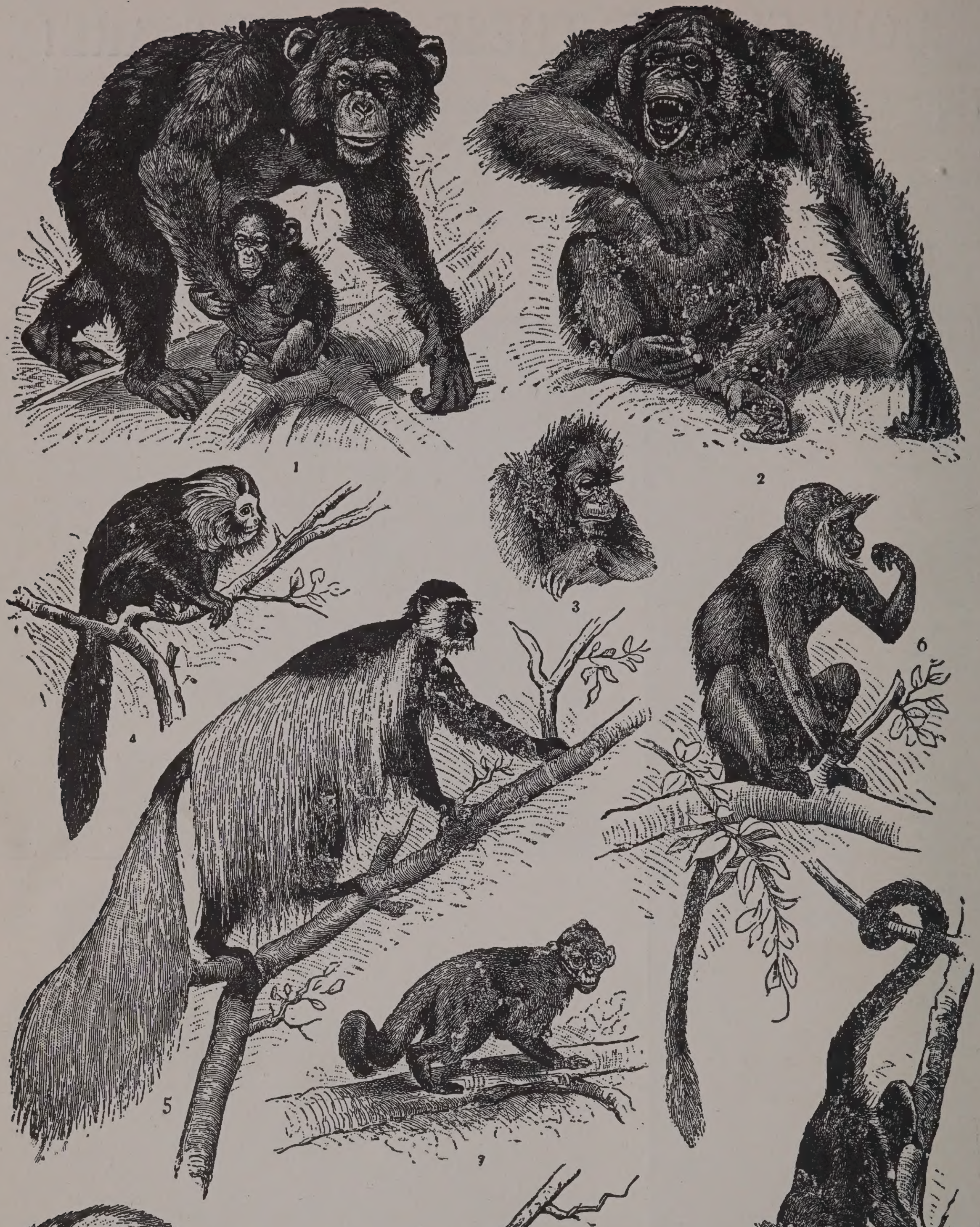
THIS trained monkey is named Susie. She was brought from monkeyland and taught to pick up a cube, a ball, a cylinder and other shapes just as if she were in a kindergarten. Her big, wild relation (1) is climbing through the tree tops with her baby. Figures 2, 3 and 4 show how these "acrobats" swing from tree to tree.







Here Susie is asked by the little boy to pick out various colors of cloth. Her owner is snapping his fingers to get her close attention. Monkeys are like little people—they do best when they pay close attention.



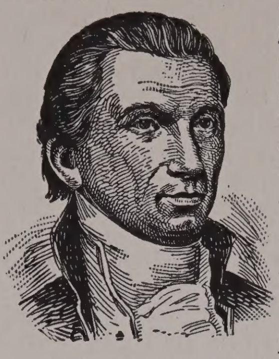
1 Chimpanzee 2 Orang-Outang 3 Young Orang-Outang 4 Red Ape 5 Guereza Monkey
6 Hanaman Monkey 7 Capuchin Ape 8 Dog-faced Baboon 9 Wooly Monkey 10 Spider Monkey

stem, in which the woody bundles are scattered, as in the common corn; the parallel-veined leaves, and the members of the flowers in threes. Monocotyledons were once called endogens, an antiquated name which has been entirely abandoned. Prominent monocotyledonous groups are as follows: Pond-weeds, among which are the numerous more or less submerged aquatics and closely-allied forms, and related to which are the well-known forms of arrowleaf and cat-tail flag; grasses, one of the largest and most useful groups of plants, much confused with the nearly allied sedges; palms, a group of tree monocotyledons very characteristic of the tropics; aroids, an immense tropical group represented in temperate regions by skunk-cabbage and Jack-in-the-Pulpit and in cultivation by the better known calla lily; lilies, associated with which are the numerous amaryllis and iris forms; and orchids, which in number of species are most numerous among the monocotyledons and favorites in greenhouse cultivation on account of their brilliant color and bizarre forms

Monongahela (*mō-nŏn′gȧ-hē′lȧ*), a river, one of the sources of the Ohio, rises in West Virginia, flowing north into Pennsylvania where it unites with the Allegheny at Pittsburg and forms the Ohio. It is 250 miles long, and is navigable for about 80 miles for large boats. Cheat River and the Youghiogheny are its chief branches. Here, on the banks of the river, near Pittsburg, was fought, July 9, 1755, a battle between the French and the Indians and the British and colonial troops under Braddock. The latter were beaten.

Monop′oly, a term used to indicate the sole right to sell or trade in any article, given to a single person or to a group of persons. In early times this right was often granted by government, as in the time of Queen Elizabeth, salt and coal were articles whose sale was thus limited; and one of the greatest monopolies the world has ever known, the East India Company, received its charter at that time. These government monopolies were opposed by the English people, and finally ended. Monopolies, under their modern form of trusts, combines, syndicates or unions, are the same in principle, an effort to do away with competition and give to one set or class of persons the sole right of selling or trading in an article. These combinations are effected by the use of capital, which is employed to drive out of business all small dealers. The Standard Oil Company and the Reading coal "combine" are well-known instances of great American monopolies.

Monroe′, James, the fifth president of the United States, was born in Westmoreland County, Va., April 28, 1758. He entered William and Mary College, but soon left to join the army under Washington. He was in several battles, was wounded at Trenton, and became lieutenant-colonel and military commissioner. In 1782, after studying law with Jefferson, he became a member of the Virginia assembly and was sent the next year to Congress. Here his services were influential in bringing about the conventions at Annapolis and Philadelphia, where the Constitution of the United States was framed, which, however, he opposed in the Virginia convention, siding with Patrick Henry and other states' rights men. He was in the United States senate from 1790 to 1794, and became minister to France from 1794 to 1796, when he was recalled because of his too open expressions of sympathy with the Revolution. His former opposition to Washington and this treatment induced him to publish an attack on the government, which made him the favorite of the Democratic party. He was governor of Virginia for three years, and then was sent by Jefferson to France, where, with Robert Morris, he effected the Louisiana Purchase in 1803. His efforts for a cession of Florida by Spain were unsuccessful, and the treaty with England obtained by him failed to provide against the seizing of American sailors. In 1811 he again was governor of Virginia, and secretary of state under Madison until 1817. In 1816 he was elected president and re-elected in 1820. The most popular measures of his administration were the obtaining of Florida from Spain (1819), the settling of the slavery question by the Missouri Compromise, the recognition of the independence of the Spanish American republics and the announcement of what is known as the Monroe Doctrine. In a message to Congress approving the bill which recognized the South American republics Monroe declared that "the American continents are not to be considered as subjects for colonization by any European power." This declaration, known as the Monroe Doctrine, has ever since held a place as well in the diplomacy as in the political creed of the nation. After his retirement to his home in Virginia he became involved in debt, but found a home with his son-in-law in New York, where he died, July 4, 1831. See *Life*, by Gilman, in the American Statesmen Series.


JAMES MONROE

Monroe Doctrine. See MONROE, JAMES, and UNITED STATES.

Monsoon′, a term meaning a set time or season, formerly used to indicate the winds prevailing in the Indian Ocean, blowing from the southwest from April to October and from the northeast from October to April. The word is used now of all winds that are regular, returning with the seasons. The prevailing winds of North America are largely of this class, and there are monsoons in Australia and on the coasts of Brazil, Peru and North Africa. See Winds.

Montagu (*mŏn'tȧ-gū*), **Mary Wortley,** was born about 1689 in Nottinghamshire, England. When only eight years old her father introduced her to the famous Kit-Cat Club, of which she became a member. After her marriage her husband's public position brought her into court society in London, where she was celebrated for her wit and beauty, and numbered among her friends Addison, Pope and other literary men of the time. In 1716 her husband was English ambassador at Constantinople, and during her life there of two years she wrote the *Letters* that have made her famous, addressing them to her sister, to Pope and other friends. They are descriptions of eastern life and manners. She became convinced of the benefit of inoculation for smallpox while abroad, and introduced it into England, trying it first on her own son. She died on Aug. 21, 1762. See *Life* in the edition of her works by Wharnecliffe.

Montaigne (*mŏn-tān'*), **Michel Eyquem de,** a famous French essayist, was born in 1533 in Perigord. His father had peculiar ideas of education, and put them in practice in his son's case. He was nursed by a poor woman in a village, that he might learn simple habits of living and sympathy with the poor. That his boyhood might be made as happy as possible, he had him wakened every morning by the sound of music. As he must learn Latin, then the necessary foundation of all education, he had him taught it in the easiest way, by conversation, and until he was six he understood no other language. His father sent him to school at six, making various arrangements to carry out his plans of education. He studied law, and became a city counselor, holding the office for 13 years. His first literary work was a translation of a Spanish *Natural History*. On the death of his brothers he succeeded to the family estate, and here began his famous *Essays*, which were written simply because he felt the need of occupation. These essays, written apparently without any plan, inspired by the caprice of the moment, touching upon his daily life, habits, tastes and thoughts on all kinds of subjects, have held the attention of a large class of readers of all kinds and sorts for 300 years. The circle of admirers widens every year, and is almost equal to that composed of the followers of Shakespeare. He died in 1592. See *Representative Men* by Emerson and *Montaigne* by Collins.

Montana (*mŏn-tä'nȧ*), one of the northwestern states of the Union, is the third in size, coming next to Texas and California, covering a surface of 145,310 square miles and being larger than the British islands. It is bounded on the north by Canada, south by Wyoming and Idaho, east by the Dakotas and west by Idaho.

Surface. The Rocky Mountain region in the west includes one fifth of the state, while the east is dry, rolling plains, needing irrigation to make them productive. The mountainous part rises from 8,000 to 11,000 feet high, with high valleys and passes, but the eastern plains are lower than Colorado or Wyoming, so that the climate is somewhat milder. The dry regions have already been improved by canals and reservoirs built by private enterprise. The Bad Lands, as they are called, near Yellowstone River, have a peculiar soft, sticky soil, in which animals sink at every footstep. The Rocky Mountains cross the state for 300 miles, with numerous smaller ranges and fertile valleys.

Drainage. The Missouri flows 1,300 miles in Montana, and Clark's Fork of Columbia River runs north into Idaho, their sources being scarcely a mile apart. Through a great cañon, cut for five miles through a gorge from 600 to 4,000 feet deep; past Bear Tooth Mountain, 2,500 feet high; by the Long Pool, with its strange, booming noises; over the Great Falls, where, in four separate descents in 15 miles, its waters fall 450 feet; and through five miles of rapids the Missouri River makes its way. The Yellowstone, rising in the National Park, crosses the entire state for 850 miles. There are many mountain lakes and numerous mineral springs. The Warm Springs are near the wigwam-shaped geyser, with its smoke ascending like a council fire, in Deer Lodge Valley. Near Helena the hot springs have created a resort for invalids and tourists, with one of the largest bathhouses known and a very fine hotel.

Climate. The climate is variable, with sudden changes and scanty rainfall east of the mountains, while in the northwest the rainfall is more ample and the climate made milder by the great, warm current from Japan. The chinook winds also have a great effect on the climate. These warm winds may occur in any part of the state, making the air very mild, and melting large quantities of snow in a short time. Because of the absence of humidity the climate is very healthful, and especially beneficial to those affected with pulmonary trouble.

Minerals. The greatest wealth of the state is mineral, and its foremost industry is mining. About one third of the gold, silver, copper and lead mined in the United States is from Montana. The first gold was discovered in 1852, but little was done in mining until 1861, the mines now producing enormous quantities and bringing great wealth to their owners. Silver, lead and copper are also mined, these, with gold, producing in one year nearly $70,000,000

Large beds of coal and deposits of iron-ore, building-stone, coal and extensive claybeds are also found. The mining of sapphires began in 1891, four regions are worked, and Montana leads the Union in this product.

Forestry. More than one fourth of the state is covered with timber. In the western part white cedar, white pine and Engelman's spruce grow, and along the streams are forests of cottonwood. In the dry portions are stunted red cedars, which are of great value to the settlers, as they supply wood and posts. An alpine species flourishes on the summits, and assists irrigation by holding back the melting spring snow. The government forest-reserves include a considerable portion of the state's timber, nearly 11,700 square miles.

Agriculture and Stock-Raising. Near the streams is a rich black soil; a sandy loam on the bench lands; and grazing lands on the bluffs. Dry farming has been satisfactorily tried on the uplands, and the experiment station encourages this method. In the order of relative importance the crops are corn, wheat, oats, barley and hay. Yellowstone Valley produces two and three cuttings of alfalfa, and cereals are extensively grown, through irrigation, in Gallatin, Jefferson and Madison Valleys. The orchards produce apples, cherries, plums, apricots and peaches, while small fruits, as blackberries, strawberries, currants and gooseberries, grow in large crops. Stock-raising is one of the industries, the flocks running wild, guarded by shepherds and dogs, and horses and cattle are kept in large herds on the great ranches. Montana has more sheep and produces more wool than any other state.

Manufactures. Foremost among the industries stands ore-smelting. The largest smelter in the world is at Anaconda; there are many in Butte; and one each at Helena and Great Falls. There are some large lumber mills, sawmills and some extensive factories which make doors, sash, blinds and furniture. A woolen mill is located at Big Timber, a biscuit and cracker factory at Helena and there are several clay product plants. Montana has 4,207 miles of railroad, and is served by the Great Northern, the Northern Pacific, the Burlington, the Oregon Short Line and the Milwaukee and St. Paul roads, the last putting it into direct connection with Chicago.

Education. Although Montana is quite a young state, her educational system is admirable. Twelve hundred teachers are employed and handsomely salaried, and more than 25c. is spent every day on the education of every child. In 1898 the state passed a law establishing county high schools, which are supported by county assessments and are under separate administration from city schools. The state School of Mines is at Butte, the state normal school at Dillon, the state agricultural college and experiment station at Bozeman, the state university and Sacred Heart Academy at Missoula, and Wesleyan University at Helena. A summer school of sciences was established on Flathead Lake in 1899 by the state university. It is known as the University of Montana Biological Station, and is well-patronized by other states as well as Montana. There are institutions for the deaf-dumb-and-blind, for the insane, a reform school, a soldiers' home and a penitentiary.

History. There are several United States posts on the boundary line of Canada and at other places, to keep in check the Indians, and four Indian agencies with their reservations. Montana was admitted to the Union in 1889, and has a population of 600,000 of whom 12,500 are Indians. Its capital is Helena. The other chief towns of the state are Butte City and Great Falls City. Montana was early visited by fur-traders and French missionaries, but was not settled until after the gold discovery in 1861. It has been the scene of many Indian wars, notably the terrible massacre of General Custer's forces by the Sioux on the Big Horn River in June, 1876. For further information regarding Montana the reader is referred to *Idaho and Montana* by H. H. Bancroft.

Montana, University of, is at Missoula in the western portion of the state. It consists of a preparatory department, a college of literature, science and the arts and a school of mechanical engineering. It is endowed with 72 sections of land granted by Congress in 1892, with the proviso that the land may not be sold for less than $10 an acre. The university was established in 1895. It now has 22 instructors and 360 students, of whom about a third are in the preparatory department and about 100 pursue courses in the arts. There are 22 students in mechanical engineering. Tuition is free, except in the law-school when that shall be established. Its library consists of about 16,000 volumes, and its income is about $65,000 a year.

Mont Blanc (*mŏnt blŏn*). See Alps.

Montcalm (*mŏnt-käm'*), **Louis Joseph,** Marquis de, was born near Nîmes, France, Feb. 29, 1712. He became commander of the French army in Canada in 1756, soon capturing the British fort at Oswego. Crossing Lake George, with 8,000 French and Indian troops, he took Fort William Henry, where the Indians' massacre of the helpless women and children has left a blot on his memory. He defended Ticonderoga against a large British force under Abercrombie, and then moved to protect Quebec. In the attack by General Wolfe the French were driven back into the city, and in the retreat Montcalm was fatally wounded, dying the next morning, Sept. 14, 1759. When told of his danger he said: "So much the better; I shall not live to see the surrender of Quebec." See *Montcalm and Wolfe* by Parkman.

Montclair', N. J., a picturesque, progressive town in Essex County, five miles northwest of Newark and 14 from New York, many of whose merchants and professional men have their homes here. It is on the Delaware, Lackawanna and Western and New York and Greenwood Lake railroads. The state normal school for northern New Jersey is located at Montclair Heights, a charming suburb which has an elevation of 370 feet above tide-water. Montclair has fine churches, schools, libraries, banks and other adjuncts of a growing city. Population 33,000.

Montebello, Duke of. See LANNES, JEAN.

Monte Carlo (*mŏn'tā kär'lō̇*), a small town in Monaco, known as a great resort of gamblers. The gaming rooms are built on ground owned by the Prince of Monaco, and are owned by a stock-company. The number of visitors often reaches 400,000. See MONACO.

Montefiore (*mōn'tė̄-fė̄-ō'ra*), **Moses,** a Jewish philanthropist, was born at Leghorn, Italy, Oct. 24, 1784, though London was the home of his parents. He inherited wealth and became a successful stockbroker. He became prominent in all efforts to improve the condition of the Jews, making seven journeys to the east and visiting Poland, Russia, Rumania, Damascus and Jerusalem, to investigate their condition and relieve their oppressions. His last journey was made when he was 92 years old. He established colonies of Jews and refuges for the poor in Palestine. His benevolence was not confined to his own race; he gave largely to all charitable institutions, and in 1835 was one of the parties to the contract to pay $75,000,000 to the owners of slaves in the British dominions to compensate them for freeing their slaves. He was knighted in 1837, and in 1864 made a baron, in recognition of his services to the poor. He died at Ramsgate, in England, July 28, 1885, over 100 years old. See *Diaries of Sir Moses and Lady Montefiore.*

Montenegro (*mōn-tā-nā̆'-grō*), a small state in southern Europe, in the Balkan peninsula formerly a constitutional monarchy but since the World War (*q. v.*) has been made a part of the newly created state of Jugo-Slavia (*q. v.*) It has a low coast region on the Adriatic and then a mountain region, 6,500 to 8,000 feet high, broken up into peaks and crags, ravines and gorges, with rivers running often for miles underground. The mountains are well-wooded and give good pasturage. There is very little of the country that can be cultivated; the farms are small, and the fields are little patches clinging to the mountain-sides. Corn, rye, oats, barley, potatoes and fruits are the products. The people live in small stone-houses in villages. A "headman," distinguished by wisdom and courage, is usually the political leader and judge. They are Slavs, belong mainly to the Greek church, and number (1917) 436,789. They are sturdy mountaineers, whose business for many generations has been to fight the Turks. Montenegro formed part of the Servian empire in the 14th century, but secured its independence when Servia was conquered by the Turks. At one time the Montenegrins were governed by bishops, but in 1851 they separated the state from the church, elected a prince and made the throne hereditary in his family. The country is progressing rapidly. Good roads have been built, fields cultivated and a standing army maintained. There is a rich literature of patriotic songs and ballads, and Prince Peter II (1830–51) was one of the greatest poets that has written in the Servian language. The first Slavonic books were printed in Montenegro in the 15th century. The capital is Cettinjé (population 4,300). See *Montenegro* by Denton and *A Winter in Albania* by H. C. Brown.

Monterey', a city, the capital of the inland state of Nuevo Leon in northern Mexico. It is a well-built town with tasteful houses, handsome churches, a cathedral, colleges and government buildings. It is one of the most prosperous manufacturing towns of Mexico. It was founded in 1599. In the Mexican War it was besieged and taken by the American forces under General Taylor, Sept. 24, 1846. Population 81,006.

Montesquieu (*môn'tĕs-kē-ĕ'*), **Charles de Secondat,** Baron de, a French writer of eminence, was born near Bordeaux, Jan. 18, 1689. He was also called Charles Louis de la Brède. He was councilor of the parliament of Bordeaux and, afterward, president. His studies at first were in the direction of the natural sciences, but, his eyesight failing, he turned his attention to literary work. His first success followed the publication of the *Persian Letters*, pretending to have been written by two Persians who visited Paris. They are satires on French customs and society. He spent three years in travel, observing the institutions and habits of foreign countries. In England he remained two years, seeing its best society and studying its philosophy in the writings of Locke and others. His ablest work, *Thoughts upon the Causes of the Greatness of the Romans and of their Decay*, appeared in 1734. Another great work, the product of 20 years of toil, was *The Spirit of Laws* in 1748. While this book came too late to save France from the Revolution, it guided its best thinkers in the restoration of order and civil government. His eyesight failed entirely before his death, which took place in Paris, Feb. 10, 1755. Montesquieu's literary style is characterized by vigor, suggestiveness and a remarkable facility for apt illustration.

THE MONTESSORI DEVICES

WHAT THEY ARE AND HOW TO USE THEM IN THE SCHOOL AND HOME

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Dr. Maria Montessori

Here is "the only example of an educational system inaugurated by the feminine mind."

DR. MARIA MONTESSORI, founder of the Montessori system, began her career in the medical profession. The only daughter of middle class parents, brilliant and ambitious, she was the first woman to obtain a medical degree from the University of Rome. Making a specialty of children's diseases, she became director of an institution for the feeble minded. It was in connection with this work that she first developed her system and became interested in its possibilities as applied to normal children. She resigned from the institution and became a student of philosophy in the University of Rome, specializing in child psychology and visiting primary schools. In January, 1907, she opened in Rome the first Case dei Bambini, or "Children's House." Her work almost immediately attracted wide attention.

In 1911 Switzerland established the Montessori system in its schools, and E. G. C. Holmes, the chief inspector of the elementary schools of England, as a result of personal investigation, said to Dr. Montessori:

> She is great because she has discovered Froebel's master principle for herself, and in so doing has interpreted it anew . . . . In theory Froebel left much to the child's initiative; in practice, comparatively little.

The Montessori system is part of the course of instruction in many leading normal schools in Canada and its importance is widely recognized by educational leaders in the United States where its adoption is being promoted under the auspices of the Montessori Educational Association of Washington, of which Mrs. Alexander Graham Bell is President and Dr. Claxton, U. S. Commissioner of Education, Miss Margaret Woodrow Wilson, John A. Brashear, Chairman of the Educational Fund Commission of Pittsburg, and William E. Davidson, Superintendent of Education of Pittsburgh, members of the Board of Trustees.

THE SYSTEM

Teaching by the Montessori system begins with devices most directly related to the child's daily life—as those for teaching the lacing of shoes and the buttoning of dresses. Thus the occupations of home and school constantly review, supplement and emphasize each other.

Teaching Through the Fingers: One of the first steps is to train the finger tips. For example, the child learns the "feel" of letters made of sand paper and pasted upon cards. In these exercises movements are always from left to right, because of the preparation thus afforded for writing. Stress is laid upon the training of the finger tips because up to the age of six, children see imperfectly and because, up to this age, the brain is best educated through the fingers; hence, in part, their eagerness to help vision by feeling—an instinct which is either a nuisance or an education, in proportion as it is, or is not, applied under the guidance of an adult.

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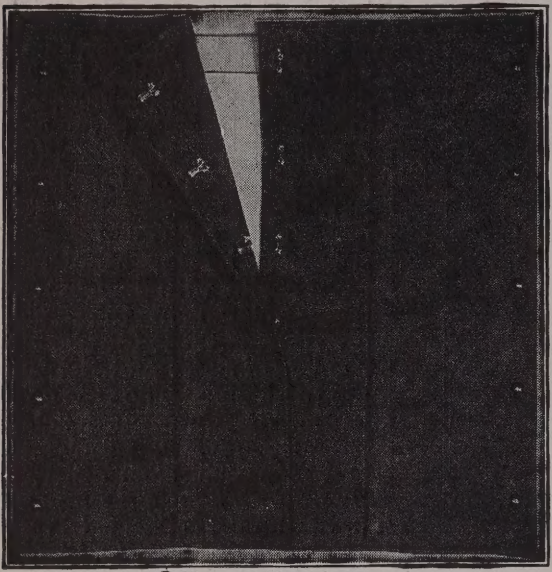
Children Using Counting and Geometrical Devices.

The child on the left is placing figure cards over the corresponding number of counting sticks; on the right is fitting geometric insets into corresponding holes. His eyes are closed and he decides which hole the cylinder will fit, solely by sense of touch.

Why the Children Are Often Blindfolded: How many of us think why, when we say "let me see," we are apt to close our eyes? Our mind-image of the thing we are trying to think about is thus made more vivid by shutting away from it all competitive images; and there are other reasons. Accordingly a good many things in a Montessori school are done by the children while blindfolded.



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HOOK AND EYE FRAME

Other features of the child's daily business of dressing are taught by means of similar frames.

Dressing Frames: A set of eight wooden frames. On six of these are mounted pieces of cloth of varying qualities to be joined by means of large buttons and button holes, automatic fasteners, small buttons and button holes, hooks and eyes, colored ribbons for bow tying and lacing through eyelets. Similar frames with leather pieces, similarly stimulate interest in shoe lacing and shoe buttoning. The children thus eagerly learn the use of their hands and usually "discover" for themselves that they can apply this skill in dressing.

FOR DEVELOPING SKILL IN NOTING DIFFERENCES IN DIMENSION, FORM AND NUMBER

The apparatus for developing skill in noting differences in number, form and dimension, include:

Solid Geometrical Insets: Three series of wooden cylinders set in corresponding holes. In the first series, diameter is constant, height varies; in the second series, height is constant, diameter varies; in the third series the cylindrical form alone is constant, height and diameter vary.

With these insets the child, working independently, learns to discriminate objects according to thickness, height and size. (For example, if he places the next-to-the-largest cylinder in the largest hole, he will find himself in the end with the largest cylinder for the smallest hole, etc.). These cylinder sets prepare for the more difficult exercises that follow.

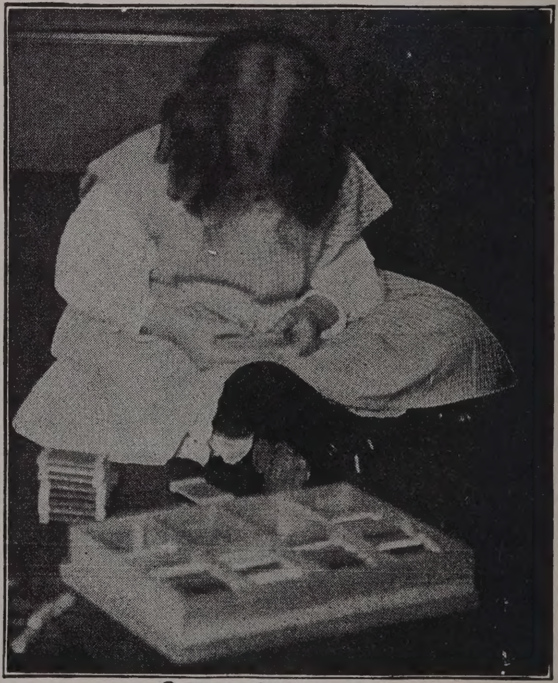
"*The Tower:*" Consists of ten wooden cubes decreasing regularly in size from 10 centimeters to 1 centimeter. With them the child builds "the tower" and learns general dimension. (This also is self corrective; since a misplaced block breaks the line.)

"*The Broad Stair:*" Ten rectangular wooden blocks decreasing in height and width, length only being constant. To teach dimension of thickness.

"*The Long Stair:*" Ten wooden square rods varying only in length; the first one meter long, the last one decimeter long, intervening ones diminishing one decimeter. Being marked off in decimeters, they teach dimension of length, help form habits of accurate classification and are later used in teaching addition, subtraction, multiplication and decimals. (Control of errors is through regularity of decreasing lengths of stairs and alternation of colors.)

Counting Boxes: These are two boxes each with five partitions containing sand paper numbers (on cards) 0 to 9, standing upright in each partition. Under these cards are the corresponding number of counting sticks. These counting sticks succeed the "long stair" in teaching elementary mathematics, the child associating the symbol with the concrete objects.

Counting Case: A case containing cards from which number combinations from 1 to 100 may be made by sliding the numbers into frames arranged perpendicularly in series of five.



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LEARNING 64 SHADES OF COLOR

This illustration shows one of the color boxes and the flat spools upon which the different colored threads are wound.

Montessori System. A system of education originated by Dr. Maria Montessori, of Rome; "the only example," says Professor Holmes, of Harvard, "of an educational system worked out and inaugurated by the feminine mind."

Within five years after a few Montessori schools were established in Rome—under quite unfavorable conditions—they were being talked about in every school system on the globe, and Dr. Montessori took rank with Froebel as the author of a profound and practical contribution to the greatest of the sciences.

By use of this system feeble minded children passed the public school examinations in Rome with higher credits than normal children outside the Montessori schools. Under the Montessori system normal children learn to read and write—for example—in six weeks, and—a matter of far wider importance—this progress is accompanied by the rapid yet wholesome development of the faculties and of the powers of resource, initiative, self control and concentration.

Who is Dr. Montessori? To what extent is her system adapted or adaptable to the needs and conditions of English speaking countries?

This article is intended to answer these questions, and to give details with regard to the Montessori apparatus that will enable mothers and teachers to employ the system to the best advantage.

WHAT EDUCATORS SAY ABOUT THE METHOD

In an extremely valuable analysis of the Montessori method, in his introduction to Dr. Montessori's work "The Montessori Method" (listed below in the bibliography of the subject), Professor Henry W. Holmes of Harvard says of the method, that "it leads to rapid, easy and substantial mastery of the elements of reading, writing and arithmetic." He thinks it highly probable, however, that the system ultimately adopted in the American schools will combine elements of the Montessori and Kindergarten methods, and advises that several combinations be tried out. He points out that while the Kindergarten does not teach children to read and write, it does teach them to deal with number, and thinks it may be fairly questioned whether it does not do more fundamental work in this field than the Montessori system.

On the subject of teaching writing he says:

> "There has been a fairly general conviction that writing is not especially important before the age of 8 or 9. In view of Dr. Montessori's teaching children of 4 or 5 to write with ease and skill, must we not revise our estimate of the value of writing and our procedure in teaching it?"

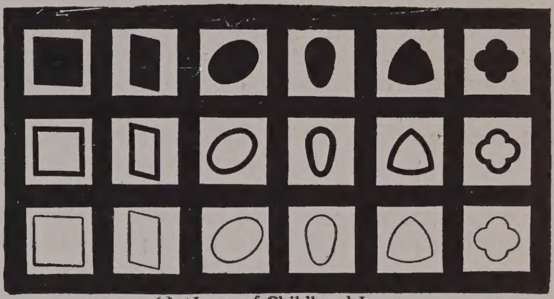
But, in his opinion, writing and reading for young children should not be unduly emphasized. He says:

> "Let us remember, as Dr. Montessori does, that reading and writing should form but a subordinate part of the experience of the child, and should minister in general to his other needs. With the best of methods, the value of reading and writing before six, is questionable."

> "Of the technical advantages of the Montessori scheme for writing, there can be little doubt . . . . . The exercises have the very important characteristic of involving a thorough sensory analysis of the material to be mastered. Mauman has taught us the great value in all memory work, of complete impression through prolonged and intensive analytical study."

But we must not expect as rapid advancement in writing and reading English as Dr. Montessori has achieved in teaching Italian:

> "In Italian, the letters once learned, it is a simple matter to combine them into words, Italian spelling is so phonetic, but it is the unphonetic character of English spelling which has largely influenced us to give up the alphabet method of teaching children to read. We have found it more effective to teach whole sentences or rhymes by sight and then analyze the words thus acquired into their phonetic elements. The mastery of the alphabet by the Montessori Method will be of great assistance in teaching children to write, but of only incidental assistance in teaching them to read and spell."



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FORM REDUCED TO LINE

"The child passes step by step from solid objects to a mere drawing representing the figure."

BOOKS ON MONTESSORI WORK

The Montessori Method, by Dr. Maria Montessori, is a valuable text for constant study. *Pedagogical Anthropology*, by Dr. Montessori, is highly technical and is for educators, teachers and other students of education. *The Montessori Mother*, by Dorothy Canfield Fisher, is a popular exposition of the method with good description of a Children's House in Rome. *The Montessori Manual*, by the same author, is a book written to help mothers to use the Montessori apparatus in their own homes. One of the ablest, most practical and most readable books, both for mothers and teachers is *The Montessori Principles and Practice* by E. P. Culverwell, Dublin Professor of Education, University of Dublin. See also McClure's Magazine, May, 1911; Dec., 1911; Jan., 1912; June, 1912. South Dakota Educator, April, 1912; Kindergarten Primary Magazine, June, 1912; American Primary Teacher, April and June, 1912; Northwest Journal of Education, April, 1912; Elementary School Teacher, Feb., 1912; Primary Education, June, 1912; Journal of Education, April 11, and July 4, 1912.

FOR TRAINING THE COLOR SENSE.

Color Boxes: To train the child to make fine color discriminations a set of two duplicate color boxes is used. Each box contains eight colors, in a series of eight shades. In their use colors are first presented in shades strongly contrasting. A variety of games are played with these colors, one of the most interesting and useful of which resembles "Authors," each player calling for the necessary shades from others to complete his set.

FOR TRAINING THE SENSE OF TOUCH.

Sand Paper Boards: For the first steps in training the sense of touch two small boards are provided. One has half its surface covered with sand paper, the other half smooth. The other board is covered with alternate strips of sand paper of varying degrees of roughness.

"*The Fabric Box:*" A collection of squares of velvet, wool, silk, fine and coarse cotton and fine and coarse linen arranged in a cabinet with drawers. Used to train further the tactile sense and add knowledge regarding quality.

TEACHING GEOMETRIC FORMS.

Plane Geometric Insets in Wood: A six drawer cabinet containing: (1) Four plain wooden squares, rhomboid and trapezoid; (2) six polygons; (3) six circles diminishing in size; (4) six quadrilaterals (one square and five rectangles); (5) triangles of varying shapes; (6) oval, elipse, flower forms, etc.

In use, these forms are mixed and the child learns (both by sight and touch) to put them in corresponding depressions in wooden trays. (Blindfolding makes the exercise more difficult and therefore more interesting.)

Plane Geometric Forms: These geometrical insets are also reproduced in three series of cards to enable the child to pass from the concrete to the abstract sense of form. In the first series, forms are *mounted* in solid blue on the card; in the second, forms are reproduced in thick *outline;* in the third, the outline is represented by a thin blue *line.* In the use of this device the child mixes up a series of cards and a series of wooden frames and then *hides* each card form by placing over it the corresponding wooden form.

So, through these exercises, the child passes—step by step, day by day—from solid objects, to the plane figures and finally to a mere drawing representing the figure; thus developing the ability to form and carry accurate images in his mind, which is the fundamental thing in writing, drawing, designing, etc.; and, indeed, any other kind of thinking and expression about the world of concrete things.

Plane Geometric Insets in Metal: Used in the first exercises in design. The child *draws around* the form, as he has previously "drawn around it" in *feeling* it with his finger. The outline is then filled in with colored crayon. The only new step is the handling of the crayon. These metal insets are used on two little tables with sloped tops (large enough to hold three of the metal insets), which are placed on the child's own table.

TEACHING THE ALPHABET.

Alphabet Boxes: Two cases containing, in compartments like a printer's case, five complete alphabets. These letters are cut in script from stiff paper and mounted on cards. To help in memorizing and distinguishing vowels and consonants the consonants are printed in rose color, the vowels in blue.

The letters are also outlined in sand paper and mounted on cards. Being rough, these sand paper letters control the little tracing fingers and the movements so developed help a child to write a remarkably good hand in a remarkably short time.

QUESTIONS ABOUT THE SYSTEM

The general secretary of the Montessori Association, gives the following information for THE NEW STUDENT'S REFERENCE WORK in answer to the inquiries indicated:

"Is there any part of the work in which the children are all engaged in doing the same thing at the same time, or where each is doing a part of one piece of work, as in the Kindergarten?"

"No, even if the children voluntarily co-operate, as often occurs, as in building or color matching, this is not as if each were required to take part in some work."

"Can you give examples illustrating the rapidity with which children learn reading, writing and number?"

"Children in Montessori classes in Rome have learned to read and write in six weeks; others in three months. One six year old boy in an American Children's House was able to compose and write seventy-seven words one month after admission to the school. Progress in number work is equally rapid, but varies with the individual."

"Can the Montessori teacher handle successfully more or less children than the teacher under the Kindergarten method?"

"In earlier stages fewer, as each child requires individual attention. One teacher and an assistant are sufficient for 25 children. Later on as children become self disciplined, fewer teachers are required than in the Kindergarten work."

"To what extent can the mother in the home, under the Montessori method, co-operate with the teacher, and how much can she accomplish where there is no teacher in her community?"

"She can co-operate with the teacher by putting the underlying principles of the method into practice in all her dealings with her children. What she can accomplish where there is no teacher depends entirely on the time she can devote to her children; if her whole time, and she has fully grasped the underlying principles, there is no reason why she should not accomplish just as much as the professional teacher."

Montevideo (*mŏn'tē-vĭd'ē-ō*), the capital of Uruguay, is situated on the northern shore of the Plata inlet, about 125 miles east of Buenos Aires. It is built on a low point between the ocean and a small bay.

The city covers about five square miles, and has broad, well-paved streets. A cathedral with towers and a fine dome, opera-house, town-hall, university (with 112 professors and 530 regular students besides 661 pupils receiving secondary instruction) and a museum are among the public buildings. It has large beef-salting establishments, where over 400,000 cattle are killed yearly; and other industries, mainly of articles for home use. It is the cleanest and healthiest city in South America, and has a large foreign population, brought mainly from Italy, Spain and France. The first settlement dates back to 1726. Population 291,465.

Montezuma or **Moctezuma II** (*mŏn-tē-zōō'mä*), the last of the Aztec emperors of Mexico (*q. v.*), was born in 1479 and ascended the throne in 1502 He gave his chief attention to the improvement of the laws of the country and to building the magnificent palaces associated with his name. His enormous expenses led to heavy taxation, which resulted in many revolts. When Cortez (*q. v.*), the Spanish conqueror, landed in Mexico in 1519, Montezuma tried to buy him off with his treasures of gold and silver. Admitting him to his halls as a guest, he soon found himself a prisoner in the Spanish camp. To quiet a revolt of the people Cortez led out Montezuma, who was wounded by a stone thrown by some one in the crowd. This, added to his other indignities. broke his heart. Tearing the bandages from his wound, he refused all remedies and food, and died at Tenochtitlan, June 30, 1520. See *Conquest of Mexico* by Prescott and *Story of Mexico* by Hale.

Montfort (*mont'fērt*), **Simon de**, Earl of Leicester, an English general and statesman, the leader in the war of the barons against Henry III (*q. v.*), was born in the beginning of the 13th century. The king was surrounded with foreigners who fared sumptuously at the expense of the people; bad harvests and famine added to their discontent; and in 1258 the barons appeared in arms before Parliament and demanded the driving out of the foreigners and the appointment of a committee of 24 to manage affairs. Later in the same year Parliament drew up laws called the Provisions of Oxford, which the king agreed to. By these provisions the foreigners were to surrender their castles, and Montfort gave up Kenilworth and Odiham. In 1261 the king repealed the act of parliament, which brought Montfort to the front as leader of the barons. He surprised the king's army at Lewes and captured the young prince May 14, 1264. In his arrangements for a peaceable settlement of the difficulties a parliament was called, in which the barons, bishops and abbots sat, with four knights chosen from each shire and, for the first time in England, two representatives from certain towns. This may be looked upon as the germ of the modern parliament. He was, however, ahead of his times; the barons were dissatisfied and Gloucester deserted; the young prince escaped; and, joining with Gloucester, defeated Montfort, Aug. 4, 1265. He was killed on the field of battle (Evesham), but his memory survives among the people, who know him as St. Simon. *The Song of Lewes*, first printed in a collection of political songs in 1839, is a full account of this constitutional struggle of the barons.

Mont-gom'ery, Ala., capital of the state and first capital of the Confederacy (see Richmond, Va.), is a typical Southern city of culture, refinement, and industry. On the Alabama River, 180 miles above Mobile, it is an important transportation center, just south of the coal and iron and north of the timber belts. Its railway shops, textile and woodworking factories are of chief importance. The city is in a center of an area rapidly developing hydro-electrical power by means of gigantic dams on the Coosa, Tallapoosa and Black Warrior Rivers. The potential power is greater than that at Niagara. Industries are increasing rapidly, because of this great development. Population, 70,000.

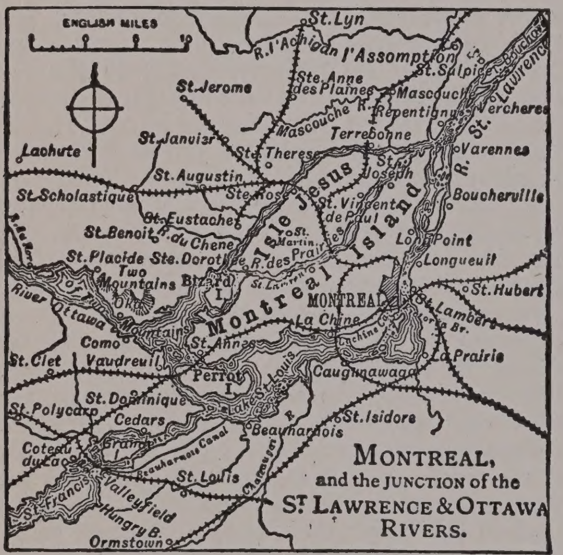
Montmorency, Falls of, are in Montmorency River, eight miles below Quebec, where it empties into the St. Lawrence. The water falls over a precipice 250 feet high and 50 wide. There is a series of natural steps above the falls worn by the water, and at the foot of the falls an ice-mountain, sometimes 200 feet high, is formed every winter. It is a place of resort for tourists.

Mont Pelee, a volcanic mountain in the island of Martinique, overlooking the town of Saint Pierre, was the scene of a terrible and disastrous eruption during May, June, July and August, 1902. On May 8th over 20,000 people were destroyed in Saint Pierre by an eruption of steam and red-hot ashes. The town met the fate of Pompeii and Herculaneum. Boiling mud, steam and rocky bombs, rather than lava, characterized the eruption. The height of the mountain previous to the eruption was estimated at 4,300 feet. After the eruption it had been completely transformed. A sort of column was thrust up above the original summit, so that the height after the eruption was no less than 5,200 feet.

Montpelier (*mŏnt-pē'lĭ-ēr*) is the capital of Vermont and the chief city in Washington County. It is on Winocski River, 206 miles from Boston. It is built on a plain, surrounded by hills. It has a granite statehouse, with a statue of Ethan Allen, Vermont Seminary, a Methodist institution and several mills, machine-shops and tanneries. Population 7,856.

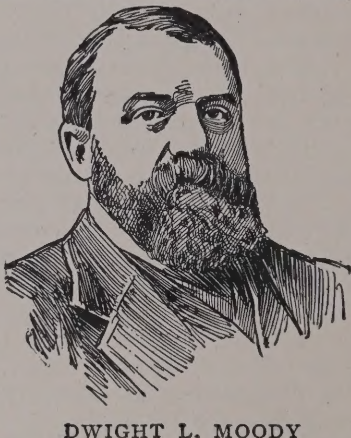
Montpellier (*môn'pá'lyá'*), a French city, 76 miles northwest of Marseilles and six from the Mediterranean. Its great industry, the production of wine, at periods suffers by the phylloxera, a minute insect that attacks the vines and almost destroys the vineyards; the cure effected by grafting the vines upon American stocks was first tried here. There is a flourishing school of agriculture devoted to the study of wine and silk-culture. Montpellier is more celebrated, however, as an ancient city belonging to Aragon or to Navarre, before it finally became a French city in 1392. Its university (1289), with schools of law, medicine and arts, rivaled that of Paris. Population 75,950.

Mont'real", in Quebec, Canada, is the commercial metropolis of all British America. It stands at the head of sea-going navigation and at the foot of the St. Lawrence canal-system and of Ottawa River. The Canadian Pacific directly links Ontario and the western provinces to Montreal. It is the western terminus of the Intercolonial Railway system. The Grand Trunk makes Montreal its chief center. Every Canadian industry (sugar-refining, iron-works, cotton-mills, car-shops, bridge-works), is represented in Montreal. The two large universities, McGill and Laval, (*q.v.*), are located here; it also has numerous smaller colleges. Its church architecture is said to the the finest on the continent. The McGill buildings also attract attention. The situation of Montreal lying on Mount Royal and along the river is most picturesque. Population with suburbs 466,000. The city is noted for its hospitals and their perfect equipment. Montreal is the home of scores of millionaires, not a few of whom are patrons of art, owning valuable paintings and generous towards educational and charitable objects. The population is mixed, the French predominating, and yet to a wonderful extent harmony and good feeling prevail. The deepening of the St. Lawrence (*q. v.*) at great cost by the government placed Montreal at the head of ocean navigation. The Dominion canals between Montreal and Lake Superior are the Lachine, Soulanges, Cornwall, Farrans Point, Rapide Plat, Glops, Murray, Welland and Sault Ste. Marie. (See articles.) Their aggregate length is 73 miles; total lockage (or height directly overcome by locks) 551 feet. The number of locks through which a vessel would pass in its passage from Montreal at the head of ocean navigation to the head of Lake Superior is 48. Soulanges Canal takes the place of Beauharnais Canal. Communication between Lakes Superior and Huron is obtained by means of the Canadian Sault Ste. Marie Canal and also by the St. Marys Falls Canal, situated on the United States side of the River St. Mary. Both these canals are free from toll. See St. Lawrence River.


ENGLISH MILES
St. Lyn
R. l'Achigan
l'Assomption
St. Sulpice
St. Lawrence
Verchères
Ste. Anne des Plaines
Mascouche
Mascouche R.
Repentigny
St. Jerome
Terrebonne
Lachute
St. Janvier
Ste. Therese
St. Joseph
Varennes
St. Augustin
Jesus
Ste. Rose
St. Scholastique
Boucherville
St. Eustache
St. Vincent de Paul
St. Benoit
St. Martin
Longue Point
Ste. Dorothee
R. des Prairies
Longueuil
St. Placide
Two Mountains
Bizard I.
St. Laurent
Montreal Island
MONTREAL
St. Hubert
River Ottawa
La Chine
Lambert
Como
St. Annes
St. Clet
Vaudreuil
Laprairie
Perrot I.
Caughnawaga
St. Dominique
St. Polycarpe
Cedars
Beauharnois
St. Isidore
Coteau du Lac
St. Louis
Valleyfield
Hungry B.
Ormstown

MONTREAL, and the JUNCTION of the ST LAWRENCE & OTTAWA RIVERS.

Mood'y, Dwight Lyman, evangelist, was born at Northfield, Mass., Feb. 5, 1837. At 17 he became an earnest Christian and zealously embraced Christian work. Wishing to strike out a new path for himself, he went from Boston to Chicago. A tireless worker, he settled down to the hunting up of ragged children in the worst parts of the city and winning them to school and to a good life. Soon a deserted saloon was hired for a Sunday-school which Moody built into a great mission.



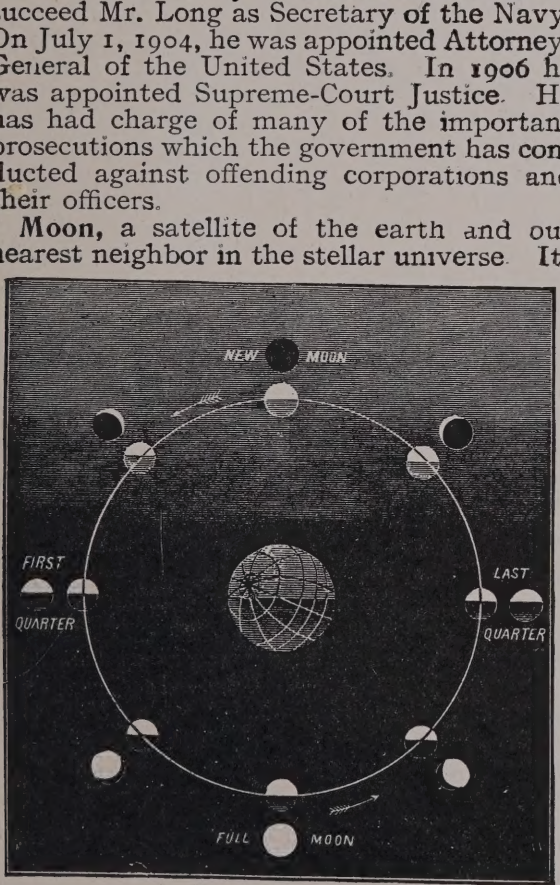
DWIGHT L. MOODY

The breaking out of the Civil War gave Moody an opportunity that was improved to the utmost. He carried on a great revival at the recruiting camp near Chicago. Soon a call came from the sick and wounded. Back and forth between Chicago and camp and battlefield Moody toiled and traveled.

Moody's great work was as an evangelist, but his many converts in Chicago, who had founded a church, forced him to become their pastor. But this charge could not keep him from carrying on great revivals which were wonderfully successful and will always hold his name in remembrance. In 1870 and 1883, with Sankey (who died in 1908), he visited England, where his success was as great as in America. Another great agency we owe Moody is the summer-school for Bible study at Northfield, where Christian workers study under the foremost preachers and professors. Connected with this school is the institute for the training of young men for this work, which was founded from the proceeds of the sale of Moody and Sankey's *Gospel Hymns*, the most popular hymn-book ever published. Many of Moody's sermons have been published. See *Moody* and the *Memoir* by W. R. Moody, his son (b. 1869), who continues the father's work in Northfield. He died on Dec. 22, 1899.

Moody, William Henry, was born in Newbury, Mass., educated at Phillips Academy, Andover, and graduated from Harvard in 1876. He took up the law, and became district-attorney of the east district of Massachusetts in 1890, serving till 1895. He successfully prosecuted the "boodle" aldermen of Lawrence. He was elected to the 54th Congress, and served also in the 55th, 56th and 57th Congresses. During that time he gained the reputation of being a thorough master of the method of conducting the proceedings of the house; and he also was of much service in the important committee of appropriations. On May 1, 1902, he was selected by President Roosevelt to succeed Mr. Long as Secretary of the Navy. On July 1, 1904, he was appointed Attorney-General of the United States. In 1906 he was appointed Supreme-Court Justice. He has had charge of many of the important prosecutions which the government has conducted against offending corporations and their officers.

Moon, a satellite of the earth and our nearest neighbor in the stellar universe. Its distance from the earth varies from 221,614 to 252,972 miles. Its apparent mean diameter is 31′ 7″ so that its real diameter is 2,163 miles, and its volume only $\frac{1}{49}$ that of the earth. The moon's mass, however, is only about $\frac{1}{80}$ of the earth's, which makes the acceleration of gravity at its surface only $\frac{1}{6}$ that at the surface of the earth. Professor Young illustrates this by saying that "a man on the moon could jump six times as high as he could on the earth and could throw a stone six times as far." The absence of any atmosphere or water on the surface of the moon has been proved by the moon's appearance in the telescope, by the spectroscope and by the absence of refraction in the occultation of stars. The moon, like the sun, moves constantly toward the east among the stars; but it gains 12° 11.4′ daily on the sun. Accordingly the moon requires $\frac{360^\circ}{12^\circ\ 11.4'}$ days to gain one complete revolution on the sun. This length of time, which is $29^d\ 12^h\ 44^m\ 2.7^s$ is called one *month.* This is also exactly the time required for one rotation of the moon upon her own axis. The consequence is that she always keeps the same side toward the earth. The other side of the moon is something that no inhabitant of the earth has ever seen. The reason why the period of the moon's rotation is exactly one month is a matter which is thoroughly understood — namely, tidal friction — but is too advanced for discussion in this place. The various phases which the moon presents will be clear from the accompanying figure which represents the earth and the moon's orbit, illuminated by a sun at a great distance above the top of the page. When the moon lies exactly in the direction of the sun we say it is "new." In this position we see none of its illuminated hemisphere; but as the moon moves away from the sun's direction we see more and more of the illuminated portion. At the end of one week, half of the bright surface is seen by an observer on the earth, and we speak of this as a "half moon." A week later we see the complete, illuminated hemisphere and call it "full moon." The moon now begins to wane and passes through these same phases, in reverse order, until the next "new moon." The moon has in all ages been and still is the subject of many superstitions. Witness such words as *moon-struck* and *lunacy.*

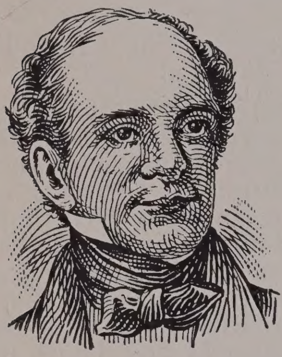


PHASES OF THE MOON

Moon'stone. See Feldspar.

Moore, Sir John, a British general, was born at Glasgow, Scotland, Nov. 13, 1761, and died at Corunna, Spain, Jan. 16, 1809. He obtained the Order of the Bath for his services in Egypt in 1801. In 1802 he was with the army in Sicily and in Sweden, and in 1808 he was put in command of the English army in the Spanish peninsula. The Spaniards failed to support him, and, when the news reached him that Napoleon with

70,000 men was marching against him, he began a retreat with his army of 25,000 men. They marched for nearly 250 miles through a mountainous country, almost impassable from snow and rain, and while embarking on their ships at Corunna were attacked by the French troops under Soult. The French were defeated with the loss of 2,000 men, but the brave leader was struck by a cannon-ball and died in the moment of victory, and was buried at night just before the troops embarked for England. The story is preserved in the well-known lines of the Rev. Charles Wolfe (*q. v.*) on the burial of Sir John Moore. See the *Life* by Moore and *Peninsular War* by Napier.


THOMAS MOORE

Moore, Thomas, an Irish poet, was born at Dublin, May 28, 1779. He was educated at Trinity College, Dublin, and in 1779 went to London, bringing out in 1800 a translation of *Anacreon*, which, with his musical talent, opened to him the best society. His *Poetical Works of Thomas Little* (a pseudonym of Moore's) followed. In 1803 he was given an official position at Bermuda, which he visited, and appointed a deputy to his office, traveling afterwards in the United States and Canada. In 1807 he began to write words for Irish national airs. These *Irish Melodies*, continued at intervals and completed in 1834, stand as the best product of Moore's poetic genius and have endeared his name to all Irishmen. His *Song of the Canadian Boatmen:* "Row, brothers, row, the stream runs fast, the rapids are near and the daylight's past," is a lyric that sings itself. In 1817 *Lalla Rookh* appeared, and the whole English world applauded. He received $15,000 for the latter, and the *Irish Melodies* brought him $2,000 a year; but his deputy in Bermuda embezzled $30,000, of which sum he was obliged to pay $5,000, and in 1809 he departed for Italy to avoid arrest for the debt. He returned to England in 1822, spending the last thirty years of his life at Sloperton cottage in Wiltshire. His later works were a *History of Ireland* and lives of Sheridan, Byron and Fitzgerald. He received a pension of $1,500 in 1835. His death occurred on Feb. 25, 1852. See *Memoirs, Journal and Correspondence*, by Earl Russell.

Moors, people living in Barbary, in northern Africa. Among them flourished the Christian church of Africa for three centuries, with Tertullian and Augustine as its leaders. The country was overrun by the Vandals from Spain in 429, and reconquered by the Byzantine emperors in 533. In 647 the Arabs subdued it, and the Moors became Mohammedans and have remained such ever since. With the exception of Tripoli and Morocco, these countries now belong to France. The Moors have always been a mixed race. In history the name is given especially to the Arab conquerors of Spain from 711 to 1492. For a short time one caliph ruled from Bagdad to the Atlantic. The Moors were finally driven from Spain in the reign of Ferdinand and Isabella (1492). They were far ahead of the people of northern Europe in architecture, literature, science and agriculture; but after the 12th century they fell behind the Christian nations who were developing rapidly, and their own divisions hastened their overthrow. See *Moors in Spain* by Stanley Lane-Poole.

Moose. See ELK.

Moose'head Lake is in Maine, and is the source of the Kennebec. It is the largest lake in Maine, 35 miles long and from 3 to 12 wide. Spencer Mountain, 4,000 feet in height, is on the eastern shore. There is fine game in the region, especially deer and caribou, which, with the attractive scenery, makes it a popular resort.

Mo'qui, Moki or **Hopi Indians** are a North American Pueblo tribe, settled on the plateaus or *mesas* of Arizona. They are more industrious than the Indians of the plains; and are skilled in carving, basketwork and pottery as well as agriculture. Their rites and ceremonies, especially the rattlesnake-dance in which live snakes are held in the mouth have attracted great interest. The tribe is believed to be very ancient; for mummies, the ruins of huts and ancient weapons, which have been discovered upon the *mesas*, are thought to be the work of the ancestors of the Moqui.

Moran (*mô-răn'*), **Thomas,** an American artist, was born at Bolton, in Lancashire, England, Jan 12, 1837. His early life was spent at Philadelphia, where he learned engraving, studying painting afterward in England, France and Italy. His large paintings, the *Grand Cañon of the Yellowstone* (7 by 12 feet in size) and the *Chasm of the Colorado* were bought by congress for $20,000. These were the first landscapes ever purchased by the government. His other works are mostly of the same class, *Balboa discovering the Pacific*, *Hiawatha and the Serpents* and *The Wilds of Lake Superior* being examples of his paintings. In 1872 he removed to New York City, his home being at East Hampton, Long Island. In 1884 he was elected a member of the National Academy.

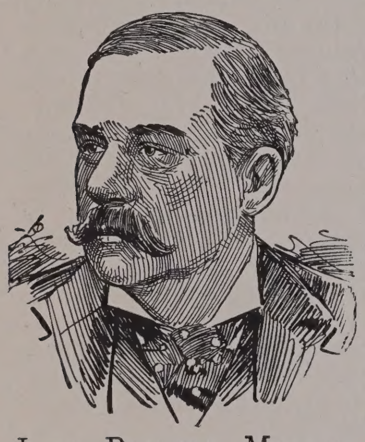
Mora'vians, Protestants formed from among the followers of John Huss, are the modern representatives of the ancient Bohemian church. They are also called the church of the United Brethren. Their church was formed after the model of the apostles and early Christians; all distinctions of rank were done away with; they were opposed to taking the oath or giving military service. The first formation of the church was in 1467 in Bohemia, increasing to between 300 and 400 churches in the beginning of the 16th century, when, from persecutions, many fled into Poland and Prussia. In 1600 they numbered two thirds of the Bohemian nation, but were involved in the revolution of that period, and the church was almost destroyed. A few descendants of the old Moravians founded in 1722 a colony at Herrnhut in Saxony on land given by Count Zinzendorf, and in 1727 formed their church anew. Their community was a pattern for other settlements in Germany, America and Britain, often named for the mother-colony of Herrnhut. Count Zinzendorf was one of their first bishops, and had much influence in deciding their customs of worship. They now number about 100,000 followers. The great distinction of the Moravians is their missionary zeal. Their first missions were started as early as 1732 in the West Indies, followed by mission-work in Greenland, Lapland, North and South America and Africa. Their missions among the American Indians were successful, one of their well-known stations being at Gnadenhutten in Ohio among the Tuscarawas. One out of every 50 members of the Moravian church is engaged in mission-work, and there are three times as many members in their mission-churches as in the home-churches. The most abandoned, hopeless and miserable people have been the first choice of the Moravian missionaries, as their missions to slaves, lepers, Indians and gypsies testify. The Moravian church in the United States has about 16,500 communicants, 130 ministers and 116 churches. Their great strength is in Pennsylvania. See *Missions* by Thompson; Hutton's *Short History of the Moravian Church;* and *History* by Bost (English translation).

More (*mōr*), **Hannah,** was born near Bristol, England, in 1745. She wrote verses when very young, publishing a drama, *The Search for Happiness*, when only 17. This was followed by two tragedies, *Percy* and the *Fatal Secret*, both of which were acted. She gave much of her time to helping the poor and originating schools for them. Macaulay in his childhood was a pet of hers. Her novel, *Cœlebs in Search of a Wife*, and the tract, *The Shepherd of Salisbury Plain*, are the most popular of her works. The tract has had an enormous circulation. She died, at Clifton, Sept. 7, 1833. See *Life* by Roberts and one by Yonge.

More, Sir Thomas, English statesman and author, was born at London in 1478. He acted as page, according to the fashion of the times, in the house of Archbishop Morton, who said to his guests: "This child waiting at the table will prove a marvelous man." When Henry VIII came to the throne, More was already known as one of the leading scholars of the time, had been in Parliament, and acted as ambassador to the Netherlands, so that Henry naturally gave him public office. He rose rapidly, becoming treasurer of the exchequer, speaker of the house of commons and, on the fall of Wolsey in 1529, lord-chancellor. The king became intimate with him, making unexpected visits at his home at Chelsea, but, when congratulated on the king's friendship, More replied: "If my head would win him a castle in France, it should not fail to go." He was sent on embassies to Francis I and Charles V. As chancellor "he was ready to hear every man's cause, poor and rich," and the only fault found has been with his decisions in religious matters. Like Erasmus and Colet, while welcoming reforms, he did not desire to leave the old church. He parted with Henry on the question of the divorce of Catherine of Aragon, and refused to take the oath acknowledging Henry as head of the church. He was beheaded on Tower Hill, London, July 6, 1535. His works were generally written in Latin; his *History of King Richard III*, however, in 1513, was written in English, and perhaps is the first example of classical English prose. His great work, *Utopia*, in Latin, made him the one literary Englishman of the 16th century who was known and admired on the continent. It was translated by Bishop Burnet in 1556, and still holds its place as an English classic. See *Life* by Roper; and *Lives of the Chancellors* by Campbell.

Moreau (*mō̍′rō′*), **Jean Victor,** one of the greatest of French generals, was born on Aug. 11, 1761, in Brittany. In the Revolution he served first under Dumouriez, and was soon made commander of a division, taking an active part in reducing Belgium and Holland. In the spring of 1796 he was given the chief command on the Rhine and Moselle, driving the Austrians back to the Danube, and regaining the Rhine in a retreat that gave him more reputation than all his victories. In 1798 he saved the French army in Italy from destruction, when hard pressed by the Russians and Austrians. His command was given to Joubert, but, at his request, Moreau remained with the army and, after Joubert's death, brought the defeated troops to France. He was offered the dictatorship, but declined, giving his help to Bonaparte. Again in command of the army of the Rhine, he gained victory after victory over the Austrians in 1800, ending with the great battle of Hohenlinden. Napoleon, possibly moved by jealousy, accused him of taking part in a plot against his life and had him tried. The evidence against him was insufficient, but he was exiled and came to America in 1804, and settled in New Jersey. In 1813, while with the emperor of Russia and the king of Prussia in their march on Dresden, he was struck by a cannon-ball, and died at Laun in Bohemia, on September 2, 1813.

Morgan, John Hunt, a Confederate general, was born at Huntsville, Alabama, in 1826. In the Civil War he joined the Confederate Army and became a bold and successful raider. His troops, known as "Morgan's Guerillas," were the terror of the border regions. He is celebrated for what is known as Morgan's raid, in which, crossing the Ohio, he dashed through southern Indiana and Ohio, but was captured while recrossing the river, and confined in the Ohio penitentiary. After his escape he led another raid into Tennessee, but was killed in a surprise attack at Greenville, Tennessee, on September 4, 1864.


John Pierpont Morgan

Morgan, John Pierpont, an American financier and philanthropist, was born at Hartford, Connecticut, on April 17, 1837. He was educated at the high school in Boston and the University of Göttingen, Germany. He began his career as a banker in 1857 in New York City. In 1860 he was appointed the American agent of the London firm of George Peabody and Company. In 1864 he became one of the firm of Dabney, Morgan and Company, and in 1871 he became a partner of the Drexels. He took a lively interest in railroad management, being director in a number of roads and active in the reorganization and development of lines that had failed in other hands. In 1895 he successfully conducted a syndicate formed for the purchase of United States four per cent bonds. Morgan had become director in no less than twenty-three railroad companies by 1900, and it was through his efforts that the great steel-manufacturing interests of the country were combined into a company having a capital of $1,100,000,000. In 1901 he purchased three lines of ocean-steamers, and with his associates engaged in the largest financial transactions which have ever been entered into by private individuals. He was an art connoisseur and collector and made many important contributions to the Metropolitan Art Museum of New York. He died in Rome on March 31, 1913.

Morgan, John Tyler, an American soldier and statesman, was born at Athens, Tennessee, on June 20, 1824. He emigrated to Alabama in 1833. He was admitted to the bar in 1845. Morgan became a delegate to the Alabama secession convention in 1861, and joined the Confederate army in the same year. He was promoted rapidly until he was made brigadier-general in 1863, serving in that capacity to the close of the war. In 1877 he was elected to the United States Senate, and reëlected to that body five times. He was appointed arbitrator on the Bering Sea fisheries in 1892 by President Harrison. In 1898 he was appointed by President McKinley as one of the commissioners to organize a territorial government in Hawaii. He died on June 11, 1907.

Morgarten (*mōr′gär′t′n*), a mountain on the border of Lake Egeri in Switzerland, near which 1,400 Swiss from Schwyz, Uri and Unterwalden won a great victory over 15,000 Austrians, on November 15, 1315.

Morgenthau, Henry, Jr., a prominent American statesman, was born in New York City on May 11, 1891, the son of Henry Morgenthau, distinguished lawyer and diplomatist. Young Morgenthau was educated at Exeter Academy and Cornell University. He entered Cornell with the intention of studying architecture, but soon became intensely interested in agriculture. He studied farm economics under Professor George Warren. He also devoted considerable time to social work at the Lillian Wald Henry Street Settlement. While attending the Agricultural College at Cornell, he suffered a physical breakdown. In an effort to rebuild his health he went to live on a ranch in Texas. It was there that Morgenthau Jr., became increasingly attracted toward farm life. When he returned to New York he purchased a 1,400 acre farm in the Hudson Valley. His farm in Dutchess County was situated near the Roosevelt estate. During the World War he served as a lieutenant in the Navy. In 1922 he became the owner of the *American Agriculturist*, a farm weekly.

In 1928, when Franklin D. Roosevelt entered the gubernatorial race in New York state, Henry Morgenthau, Jr., became business manager of his campaign tour. Upon the election of Roosevelt, the young agriculturist was appointed chairman of the Agricultural Advisory Committee, an unofficial position. Professor Warren was a member of this committee. Ever conscious of the struggle in which the farmer is ceaselessly enmeshed, the young chairman worked tirelessly in an effort to have the commission secure the enactment of reform measures which would be beneficial to the agrarian population. In 1930 Governor Roosevelt appointed Morgenthau Conservation Commissioner in which capacity he succeeded in applying new principles in scientific land utilization and cultivation.

In 1932, when Franklin Roosevelt became a candidate for the Presidency of the United States, Henry Morgenthau, Jr., assisted in developing the agricultural program for the campaign. He accompanied the President to Washington in March, 1933, as Chairman of the Federal Farm Board. Later in that year

President Roosevelt appointed him Administrator of the newly organized Farm Credit Administration, a position which he was so capable of occupying in view of his extensive study of agricultural and financial problems. He devoted a great deal of his time to explaining the New Deal in agriculture to the nation, presenting the new order of things to the farmer in a clear, concise, and simple manner. His financial views were in accord with those of Professor Warren under whom he had studied.

In November, 1933, when Secretary of the Treasury Woodin was forced by ill health to take an indefinite leave of absence from his duties, the President appointed Morgenthau, Jr., Under-Secretary and Acting-Secretary of the Treasury. On January 1, 1934, William Woodin definitely resigned his post and Morgenthau, Jr. was sworn into office as his successor. The new Secretary of the Treasury has ever been in harmony with the policies, especially monetary, of President Roosevelt. Upon succeeding to the Treasury post he attempted to hush Treasury officials who were not in accord with the President's monetary policies by ordering the suppression of all news from the Treasury Department. At a later date, however, the Secretary of the Treasury held press conferences twice weekly.

Counted among that body of college professors, experts and scholars who form a special group of advisers to President Roosevelt, and which has come to be known as the "brain trust," is Henry Morgenthau, Jr. It is to him and Professor Tugwell that credit is due for the development of the details of the Allotment plan which President Roosevelt so strongly advocated in his program for farm relief.

Moriah, Mount, a hill in Palestine, forming a part of the site of Jerusalem. Solomon's temple was built upon it, and at its foot, in the valley of Jehoshaphat, stands the Virgin's Fountain, an intermittent spring from which the water flows through an aqueduct cut into the mountain, to the Pool of Siloam. When the temple was destroyed at the taking of Jerusalem, Mount Moriah was literally plowed over. It is the site of the great mosque of Jerusalem, which occupies about one-seventh of the present city.

Morley (*môr'lĭ*), a municipal borough in the West Riding of Yorkshire, England, is situated about five miles southwest of Leeds. The manufacture of woolen goods is the principal industry of Morley. There are valuable coal mines and stone quarries in the vicinity. In 1931 the population was 23,397.

Morley, Christopher Darlington, an American author and editor, was born at Haverford, Pennsylvania, on May 5, 1890, of English ancestry. His father was a professor of mathematics at Haverford College, and his mother a gifted musician and poet. When little Christopher was ten years old, his father accepted the chair of mathematics at Johns Hopkins University. Christopher Morley was graduated from Haverford College in 1910. He had already shown talent in writing, having contributed both prose and verse to the *Haverfordian.* He was a Rhodes scholar at Oxford from 1910 to 1913, and while there published *The Eighth Sin* (1912) a collection of verse. For almost four years after his graduation he was associated with Doubleday, Page and Company, in the publishing business. During this time he married Helen Booth Fairchild of New York, and also wrote his first novel, *Parnassus on Wheels* (1917), in which he introduced the idea of a travelling bookshop. After association with the *Ladies' Home Journal* and the *Philadelphia Evening Ledger,* Morley, in 1920, began his column in the *New York Evening Post.* Under the title of *The Bowling Green* he wrote playfully but authoritatively in literary criticism. In 1924 he transferred the name and the tradition to the *Saturday Review of Literature.* He continued writing stories, essays and verse, and an occasional novel. By 1931 he had written nearly forty books, and edited twenty. His work, in whimsical strain, is nevertheless deeply critical of American life and literature. His two finest novels are *Where the Blue Begins* (1922), and *Thunder on the Left* (1925). Both are fantasies, the latter written "thru a veil of moonlight." The Morleys (including four children), were living at "Green Escape" on Long Island, but went to "Clos Margot" in Normandy for the writing of this novel. From 1928 to 1930 Morley was engaged in the production of American plays in Hoboken, New Jersey. The works of Christopher Morley were collected in the Haverford Edition of 1930. Among his other publications are: *Essays* (1928); *Seacoast of Bohemia* (1929); *Born in a Beer Garden,* or *She Troupes to Conquer* (1930), written in collaboration with Throckmorton and Nash; *Rudolph and Amina,* or *The Black Crook* (1930), and *John Mistletoe* (1931).

Morley, John, an English statesman and writer, was born at Blackburn, Lancashire, on December 24, 1838. He was educated at Oxford. He chose literature as a profession, and his writings include *Edmund Burke; Walpole; Rousseau; Voltaire; Richard Cobden,* and an essay on *Compromise and Critical Miscellanies.* From 1867 to 1882 he edited the *Fortnightly Review.* He also was editor of the *English Men of Letters Series.* From 1880 to 1883 he was editor of the *Pall Mall Gazette.* In 1880 he entered Parliament as a Liberal, where his speeches in favor of home rule, as well as his newspaper articles, did much to influence public opinion. He was Irish secretary for a short time in 1886. He supported Gladstone in 1890, and from 1892 to 1895 was secretary for Ireland. Morley opposed the Salisbury government in undertaking the Boer War. He was ever a popular public speaker. His later works embrace *Oliver Cromwell* and *William Ewart Gladstone,* besides *Studies in Literature.* In 1907 he became secretary of state for India in the Campbell-Bannerman cabinet. In 1908 he was made a viscount.

Mor'mons, believers in the *Book of Mormon.* They call themselves Latter-Day Saints, though the term Mormon is not particularly offensive to them. They constitute a religious community whose belief is founded upon revelations said to have been made to Joseph Smith in Manchester, N. Y. Born in 1805 in Vermont, he was 15 when he had his first vision; his call, as he considered it, to the work of a prophet. This was followed in 1823 by a revelation of the place where he would find the metallic plates on which were engraven the history and religion of the ancient inhabitants of America. In 1827 this record was put into his hands together with two transparent stones fastened to the rim of a bow somewhat resembling a pair of spectacles, but larger. This peculiar instrument was called the Urim and Thummim or Interpreters, by means of which he translated the unknown language of the record. Three persons were permitted to see the original record and Interpreters in a miraculous manner, while eight testified that Smith showed them the book of plates. When Smith had completed the translation, they were given into the custody of the angel Moroni, who had brought them to Smith. Such is the story of the origin of the *Book of Mormon*, the first edition of which was published in 1830 at Palmyra, N. Y. The name Mormon comes from the prophet who was commissioned to abridge the history of his people, a race said to have come from Jerusalem to America about B. C. 600; which abridgment constitutes the *Book of Mormon.* It is considered by the Mormons to be of equal authority with the Bible. The Mormon church was organized in Fayette, N. Y., April 6, 1830, with six members. Converts soon were numerous, and branches were founded in New England, Ohio and Pennsylvania. In 1831 they formed a colony in Missouri, at Independence, Jackson County, which place was revealed to them as the site of their future capital, to be known as the City of Zion. Both here and in Ohio they were persecuted. At Independence their printing-press was destroyed, some of their leading elders were tarred and feathered, and finally 3,000 of their colony were driven across the Missouri River. A company of missionaries went to England in 1837 and made 2,000 converts. In 1837–8 they settled in upper Missouri, founding the cities of Adam Ondi-Ahman and Far West, but in the late autumn of 1838 the entire church, numbering 12,000 souls, were driven from the state. They fled into Illinois where they were kindly received, and in 1839–40 founded the city of Nauvoo; but in a few years the popular dislike broke out afresh, and the prophet and his brother Hyrum, while in prison under a charge of treason against the state, were murdered by a mob on the 27th of June, 1844.

Brigham Young, president of the Twelve Apostles, came to the leadership, and with a thousand families left Nauvoo in February, 1846. They wintered in Iowa and Nebraska, and in the spring of 1847 Young with a band of 147 set out for the Rocky Mountains, reaching Great Salt Lake on the 24th of July. Others followed in the autumn and in the next year. They have many settlements in Idaho, Colorado, New Mexico and Arizona, besides Utah, and colonies in Mexico and British America; there are also numerous branches of their church in northern Europe, in many of the states of the American Union and in the Pacific islands. They number upwards of 300,000 members, the great body of which are in Utah. Their church is officered as follows: Three of the First Presidency; 12 Apostles; 200 Patriarchs; 6,800 High Priests; 9,730 Seventies 20,000 Elders, a total of what they call the Melchisedek Priesthood of 36,745; while 25,700 bear what is called the Lesser Priesthood, making a total of those who hold the priesthood of 62,445. Since their removal to Utah the chief opposition to them has been due to their doctrine of plurality of wives. For years this doctrine prevented the admission of Utah as a state. In September, 1890, however, Wilford Woodruff, then president of the church, issued his famous manifesto, discontinuing plural marriages; and in 1896 Utah was admitted into the Union. A new sect of Mormons, calling themselves the Reorganized Church have their headquarters at Lamoni, Iowa The latter is said to have 542 churches, 860 ministers and 52,000 communicants.

Morning Glory (*Ipomœa*), a flowering plant, is common in North America and Europe. It is a vine, often growing to 10 feet in height. The leaves are large, numerous and well-fitted to form a shade for porches. They are roundish and heart-shaped. The flowers are funnel-form and commonly purplish; but there are varieties of almost every color. The seeds should be planted in a sunny place in ordinary garden soil.

Morocco (*mō-rŏk'kō*), a country in the northwest of Africa, a Mohammedan empire, consisting of the kingdoms of Fez and Morocco and the territories of Sus, Adrar, Draa and Tafilet, under a reigning sultan, whose government is a despotism modified by anarchy. It contains about 219,000 square miles, of which the Sahara occupies over 200,000. The Atlas Mountains cross it in several ranges from southwest to northeast, making a large region hilly. There are rich level plains in parts of the country, and, though the soil sometimes is thin in the western part, most of it is of use for pasturage and there is little real desert. Parts of Morocco, where the sea-breezes prevail and the Atlas Mountains protect from the hot winds of the desert, are temperate; but the interior valleys are very hot in summer, and in winter ice and snow are not uncommon. The products are those of temperate and tropical countries. Sheep and goat skins, oxen and oxhides, gum and eggs, with almonds, oranges, figs, lemons and dates are among the exports, while cotton is grown for home use. The cultivation and use of tobacco are forbidden by the sultan, and no animal can be exported without his permission. The animals resemble those of southern Europe, save a few species which come from the regions of Africa to the south. The mineral wealth is almost unknown, as the interior has not been explored, but gold, silver, copper, tin, iron, coal and petroleum are evidently abundant. The mines are scarcely touched, and no European is allowed to visit them. The people, numbering about 4,500,000, are divided into six groups; the Berbers, who inhabit the mountain regions, are the original inhabitants; the Arabs, descendants of those who invaded the country in the 7th century; the Jews, who settled early in the region, with many refugees from Spain and Portugal; a few Europeans, mainly Spaniards, confined to the coastal towns; the Moors, a name given to all the Mohammedans but really belonging only to Arabs with a mixture of Spanish blood, found mostly in the large cities; and the negroes, who were brought from the Sudan as slaves. There are three capitals — Fez (population 140,000), Morocco and Mequinez; the seaports on the Atlantic are Mogador and Tangier (35,000 population) and on the Mediterranean, Tetuan.

Morocco for four centuries was a part of the Roman empire, and fell into the hands of the Vandals in 429 A. D. until, in 533 A. D., it passed to the Eastern empire. Since 680 it has most of the time been in possession of the Arabs, and the people have been Mohammedans. First it was a part of the caliphate of Bagdad. Then it divided into several independent monarchies, which, after civil wars and revolutions, united in one kingdom under Mulai-Ismail, who reigned during 1692-1727. The country is still very backward, and, though the enslaving of Christians and piracy were done away with in 1817, the interior is almost inaccessible and slavery still exists. In 1905-06 an international political crisis occurred in Europe over affairs in Morocco, Germany resenting exclusion from the Anglo-Franco understanding and alliance in Moroccan matters, which she interpreted to mean restriction of German trade and influence in the country. After a period of extreme tension between the Powers, an international conference met at Algeciras, Spain, the latter nation being party to the British-Franco-Spanish agreement. The result of the conference was to propitiate Germany by an open-door arrangement as regards trade, by drafting regulations tending to suppress the illicit traffic in arms, by the recruiting and control of a body of native police from 2,000 to 2,500 strong, distributed in detachments for the maintenance of order, especially at the ports, and by the establishment at Tangier of a state-bank. In 1924 it engaged in armed insurrection against Spain, which has partial control over it.

Morocco, the southern capital of the sultanate, is situated at the northern end of a fertile plain, 1,447 feet above the sea. It is surrounded by an earth-wall from 20 to 30 feet high, with square towers at intervals, and seven gates, said to have been brought from Spain. It has the remains of former greatness, but is poorly built, with low, flat-roofed houses without windows and with narrow, unpaved, dirty streets. It carries on a considerable local trade, though much less than Fez, with several tanning and leather-dyeing establishments. The palace is outside the city, its grounds covering 180 acres; no Europeans live within the city-walls. The city was founded in 1072, and in its greatest prosperity, in the 13th century, it contained more than 700,000 inhabitants. It has been sacked more than once in the civil wars, and has steadily declined. Its situation in sight of the Atlas Mountains and its command of the trade-routes make it probable that it will regain its former greatness whenever the country is well-governed. The city lies about 250 miles southwest of Fez. Its chief industries are the carpet and morocco-leather trade. Population 60,000.

Morpheus (*môr′fūs* or *môr′fē-ŭs*), in mythology, the son of sleep and the god of dreams. The word means the molder, and he is so called because he molds or shapes the visions of the sleeper. He is represented as an old man with wings, pouring a sleep-producing vapor out of a horn, and sometimes as lying down with a crown of poppies on his head.

Morphology (*mŏr-fŏl′ô-jĭ*), in botany, one of the great divisions of the subject, which treats of the forms of plants. The older idea of morphology was that it had to do merely with the adult organs and considered merely the various forms of leaves, stems, roots. As at present developed, morphology treats also of the development of organs. For example, it is not content with describing the mature leaf or the mature archegonium, but it states in detail the development of these organs from their most primitive conditions. It therefore includes what may be called organography, that is, the development of organs, and also embryology, that is, the development of the plant as a whole. Morphology is also closely identified with the relation of plants to one another by descent, and is therefore bound up with what is called phylogeny, which means a consideration of the ancestral forms of plant races. From this point of view morphology is also the most fundamental contributor to taxonomy or classification, which can only be natural when it expresses the real morphology of plants. In any botanical study morphology is regarded as most fundamental, for it underlies all other work with plants. JOHN M. COULTER.

Mor'rill, Justin Smith, an American statesman, was born in Orange County, Vt., April 14, 1810. He had only a common-school education, and at an early age he engaged in business, which he later gave up for farming. He was elected to Congress in 1855, remaining in the house of representatives from 1855 to 1867, at which time he was elected to the United States senate, and later was re-elected for six successive terms of six years each. His congressional service exceeded in length that of any living colleague. He held for many years in the house the important position of chairman of the committee of ways and means, and he was the author of the tariff bill of 1861 known by his name. He wrote *Self-Consciousness of Noted Persons*, published in 1886. He died on Dec. 28, 1898, at the capital of the nation.

Mor'ris, Clara, well-known actress and writer, was born in 1849 in Toronto, Canada, but at the age of three months was taken to Cleveland, where she received an elementary education To assist her widowed mother she became a member of a reputable ballet, and was fortunate in receiving valuable instruction in the art of acting. She soon became the leading lady of the company, and later attained distinction in the best theater at Cincinnati. In 1870 she joined the famous company established by Mr. Daly for his Fifth Avenue Theater, New York City. She became one of the leading actresses of America, excelling in parts that exhibit strong emotions. In 1874 she married Fred. C. Harriott. When ill-health compelled her to retire from the stage in 1885, she commenced writing books and also articles for magazines. Among her works are *Little Jim Crow*, *A Silent Singer*, *A Pasteboard Crown*, *Life on the Stage* (personal experiences and recollections) and *Stage Confidences.*

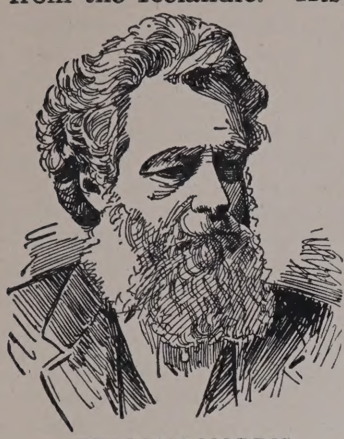
Morris, Gouverneur, an American statesman, was born at Morrisania, N. Y., Jan. 31, 1752. He was active in political matters during the Revolution. During 1781–84 he was assistant to Robert Morris, superintendent of the national finances. In 1787 he was a member of the convention that framed the United States constitution He spent part of 1791 in England as confidential agent of Washington, and was minister to France till 1794. He was three years (1800–3) United States senator from New York. He died on Nov. 6, 1816. See *Gouverneur Morris* by Roosevelt, in the American Statesmen Series, and *Diary and Letters* by Anne Cary Morris.

Morris, Robert, one of the signers of the Declaration of Independence, was born in Lancashire, England, Jan. 20, 1734. He came to America when 13 and entered a counting-house at Philadelphia, becoming a partner finally. He opposed the Stamp-Act and was elected to the Congress of 1775. He voted at first against the Declaration of Independence, but signed it when it was adopted. He was again in Congress in 1777, and chiefly managed the finances of the country. In 1781 he was elected superintendent of finance, and had almost entire control of the money operations of the new government. He established the Bank of North America in 1782, and in supplying the army in 1781 issued his own notes for over $1,000,000, which were finally repaid. He resigned in 1784, declining in 1788, when senator, the secretaryship of the treasury offered him by Washington. From 1789 to 1795 he represented Pennsylvania in the United States senate. He, with Gouverneur Morris, sent the first American vessel to Canton in 1784. He lost his fortune by speculation, and was confined in prison for debt during the last years of his life. He died at Philadelphia, May 8, 1806.

Morris, Sir Lewis, an English poet of Welsh origin, who was knighted in 1895 for his verse, was born in 1832 at Carmarthen, Wales, studied at Oxford, and practiced law until 1881, when he was appointed secretary of the University of Wales. His first poems, *Songs of Two Worlds*, published under the name of A New Writer, were very popular, passing through several editions. His *Epic of Hades* appeared in 1876, and since then, *Gwen, a Drama; The Ode of Life; Gycia, a Drama; Songs Unsung; A Vision of Saints; Songs without Notes;* and *Idylls and Lyrics*, all of which have been popular. He had a felicitous literary style, pure and elevated in tone. His later writings include *Harvest Tide* and *The New Rambler.* He died in London on Nov. 12, 1907.

Morris, William, an English poet, was born near London in 1834. Educated at Oxford, he became intimate with the painter, Burne-Jones, and studied painting himself. In 1858 appeared his first poems, *The Defense of Guenevere and Other Poems*, which were scarcely noticed, though they are the work that will give him a name in the future; his long poem, *The Life and Death of Jason*, in 1867, attracted attention; and *The Earthly Paradise* confirmed his reputation as a poet. His later publications are *Love is*

Enough, *Fall of the Niblungs* and translations from the Icelandic. His socialistic writings and speeches occupied him of late years to the exclusion of poetry. His name is also identified with the household decorations, wall-papers, tiles and stained glass manufactured by the establishment founded by him in 1863, which are well-known in all art circles. His lectures on *Hopes and Fears for Art* were published in 1882. He died at London, Oct. 3, 1896. See *Bibliography* by T. Scott and *Lives* by Cary and Mackail.

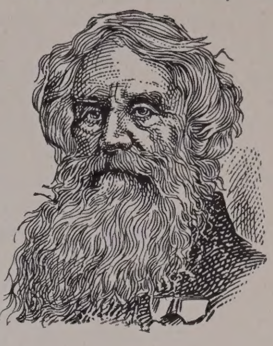

WILLIAM MORRIS

Mor'rison, Robert, the founder of Protestant missions in China, was born in Northumberland, England, Jan. 5, 1782. He was sent out in 1807 by the London Missionary Society to Macao and Canton. In 1814 he had translated into Chinese and printed the New Testament, and four years later the Old Testament, with the help of an assistant. In 1823, as translator for the East India Company, he printed the Chinese dictionary at an expense of $60,000. It was the work of 16 years, and in working on it he collected a library of 10,000 Chinese books. The dictionary was afterward translated into Japanese. He established an Anglo-Chinese college at Malacca. He visited England in 1824 and presented his Chinese library to University College, London. While acting as interpreter to Lord Napier, he died at Canton, Aug. 1, 1834. See *Memoirs* by Mrs. Morrison and *Robert Morrison* by Townsend.

Mor'ristown, N. J., the capital of Morris County and a place of much historic interest during the Revolutionary War, is situated in northern central New Jersey, 30 miles west of New York City. It is at a high elevation, and is the home of a number of New York merchants. Here is the famous Ford mansion, occupied by General Washington, now the property of the state's Historical Society. It is reached by the Delaware, Lackawanna and Western Railroad. At Morris Plains, near by, is the New Jersey Lunatic Asylum. It is a city of schools, seminaries, hospitals, churches, libraries and banks, and has all the equipment of a growing civic center. Population 12,507.

Morse, Samuel F. B. "I wish that in one instant I could tell you of my safe arrival, but we are 3,000 miles apart and must wait four long weeks to hear from each other."

Finley Morse, a 20-year-old, homesick boy, wrote this sentence in a letter to his mother in 1811. She was in the house where he had been born, and he had taken a long and final flight from the home nest to London, to study art. Twenty-one years went by before a chance conversation aboard ship brought the idea of the electromagnetic recording telegraph to the mind of its inventor, and 55 years before the first cable-message flashed under the Atlantic. The record of that long life of 81 years is one of courage, integrity, patience and faith; of poverty and struggle nobly endured; of obscurity and ridicule nobly chosen; of success and honor hardly won and nobly worn. In time wireless telegraphy may supersede the present method, but Morse's life must continue to inspire others to great deeds.


SAMUEL F. B. MORSE

Fulton was in London with the idea of the steamboat taking shape in his mind, and Whitney in the senior class in Yale and soon to invent the cotton gin, when, in 1791, Samuel Finley Breese Morse was born in a Congregational parsonage in Charleston, Massachusetts. Samuel Finley, great-grandfather, had been president of Princeton College; his grandfather was a judge on the bench; and his father was a famous divine who counted among his friends and correspondents no less a person than General Washington. So four honored names were bestowed on the baby, and it was taken for granted that he should distinguish himself in some one of the learned professions. From babyhood he was used to the society of famous men and gracious ladies, and the greatest care was taken of his education. There were no public schools at that time, so, after he was seven, Finley was at home only during vacations. He went to Andover grammar-school, to the Phillips Academy and to Yale, where Pres. Timothy Dwight took a personal interest in him. Courteous, studious, with his father's dignity and his mother's gracious manners, young Morse commended himself to teachers and students alike. So deeply did he become interested in chemistry and natural philosophy, especially in electromagnetism, that he remained in New Haven throughout one vacation in order to experiment in the laboratory.

Like Fulton, Morse combined a talent for art with aptitude in physics and skill in mechanics. These are not so far apart as one might think. All imply the possession of imagination and creative power of a high order. To miniature-painting Morse early turned as a means of earning money. It was a keen disappointment to his father when his oldest son, the bearer of so many honored names, chose to be an artist, for art in New England was looked upon at that time as a frivolous pursuit. Nearly 20 years of struggle followed, but recognition came at last He painted a portrait of the Marquis de Lafayette in 1825, and organized the National Academy of Arts and Design in New York. At 40 years he stood at the head of his profession in the United States. He had no other thought than to devote his life to art when, in 1832, he was returning, with fresh honors, from Europe in the steamship *Sully*. On shipboard there happened to be several men who were interested in electricity. Mr. Morse suggested that the repeatedly broken current ought to furnish a means of communication. As he sat on deck, he worked out his plan in a series of drawings and explained them to his fellow-passengers. It consisted of a battery and a wire for transmission with an electromagnet, a recording pencil and a roll of paper at the receiving end. The pencil was to be fixed at one end of a pivoted bar, under a weak, permanent magnet, and was to be moved up and down by sparks of electricity sent over the wire. In this way dots and dashes of the Morse alphabet were to be recorded. Morse arrived in New York, a successful artist, with commissions awaiting him, and a life of ease, honor and wealth, only to disappear into a little shop in New Haven and live long years of poverty, obscurity, toil and ridicule.

His wife was dead, his children scattered among relatives. The man lived alone in his shop, sleeping on a cot there, cooking his own food, often going hungry. Once his old friends sought him out with $3,000 in hand and a commission for a great historical painting, but he refused. He consented, however, to teach in the Academy of Arts of Design in order to earn his bread. So he worked alone for five years. It was in 1837 that he applied for a patent on *The American Electromagnetic Telegraph.* All at once the fruits of these "wasted years" as his admirers called them, matured, but, although startling in the laboratory experiments to which he admitted the world, the "wild scheme" was thought impractical. It was not thought probable that Congress would make an appropriation of $30,000 to build a line from Washington to Baltimore. But the money was secured and in May, 1844, the first message was flashed over a wire. It read: "What hath God wrought?" The inventor's labor of 12 years was crowned with success. He was 53 years of age. Seven years later the Western Union Telegraph Company was organized, and St. Louis connected with Buffalo by wire. In 1843 he suggested the Atlantic cable. The first attempt to lay a cable across the Atlantic was made in 1857 by Cyrus W. Field (*q. v.*) and Mr. Morse. Four cables parted, but the fifth was successfully laid in 1866.

The first money made by the inventor was given to charity. As his fortune increased, he built a villa at Locust Grove on the Hudson. Here he gathered his children about him, and brought his second wife. He surrounded himself with books and pictures and extensive gardens. His home became as famous for its gatherings of distinguished men and women as his father's in Charleston had been. A quarter of a century he lived there and in a stately mansion in New York City, a man of wide learning and influence, of public importance and personal distinction His death in 1872 was universally deplored, and his character is to-day as precious a heritage to mankind as is his extraordinary achievement.

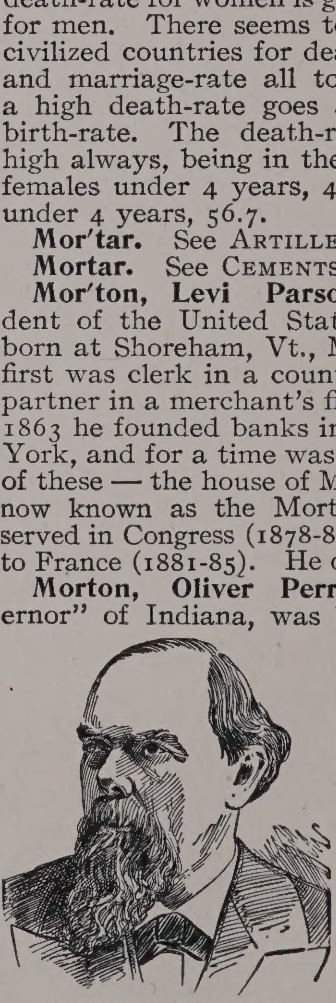
Mortal'ity or death-rate is measured by the number of people per 1,000 who die, on the average, in one calendar year. Russia perhaps has the highest death-rate; the United States a low death-rate. In Australia, although the birth-rate is low, the death-rate is so low that there is a more rapid natural increase in the population than in any country of Europe In general, married people have a lower death-rate than single people, probably chiefly because sickly people less frequently marry. The death-rate for women is generally lower than for men. There seems to be a tendency in civilized countries for death-rate, birth-rate and marriage-rate all to decline. Usually a high death-rate goes along with a high birth-rate. The death-rate for infants is high always, being in the United States for females under 4 years, 47.5; and for males under 4 years, 56.7.

Mor'tar. See ARTILLERY.

Mortar. See CEMENTS.

Mor'ton, Levi Parsons, ex-vice-president of the United States (1889–93), was born at Shoreham, Vt., May 16, 1824. He first was clerk in a country-store and then partner in a merchant's firm at Boston. In 1863 he founded banks in London and New York, and for a time was at the head of one of these — the house of Morton, Bliss & Co., now known as the Morton Trust Co. He served in Congress (1878-80) and was minister to France (1881-85). He died in 1920.

Morton, Oliver Perry, the "war-governor" of Indiana, was born in Salisbury, Wayne Co., Indiana, Aug. 4, 1823. He studied at Oxford, O., and practiced law in Indiana. In 1860, as lieutenant-governor, he succeeded Governor Lane in the governorship He became famous in the next four years as one of the war-governors, raising troops and borrowing money on his own notes to carry on the state government. He was re-elected


OLIVER P. MORTON

in 1864, and became United States senator in 1867 and 1873. He was influential in Congress, serving on important committees and advocating the 15th amendment to the constitution. He died at Indianapolis, Nov. 1, 1877, having been a cripple from paralysis since 1865. See *Life* by Foulke.

Mosaic (*mô-zā'ĭk*) is designs in colored stones or glass, made by the use of small pieces fitted together, and held in place by cement. The pattern or picture becomes thus practically indestructible. This art flourished during the palmy days of Rome, being used for floors, walls and ceilings alike. It was revived under the Byzantine empire, especially for churches; and came into great popularity again in Italy during the middle of the 13th century. In the workshops connected with the Vatican workmen are constantly engaged in reproducing in mosaic the pictures of world-renowned artists, using not simply marbles of natural colors, but glass and artificial stones especially prepared and exquisitely tinted for this purpose. Very striking effects are produced by the use of glass backed with gold or silver, or colored like sea-shells. Not only have the Russians greatly excelled in modern mosaics, but the Americans, and some of the finest designs ever produced are to be found in American public-library buildings, notably at Washington and Chicago. Florentine mosaic, used chiefly for jewelry, personal ornaments and paper-weights, is composed of shells or stones of natural colors cut in much larger pieces than are employed in Roman mosaics. The demand for mosaic increases every year, and skill in the use of the materials employed will doubtless bring the art to great perfection in our own country.

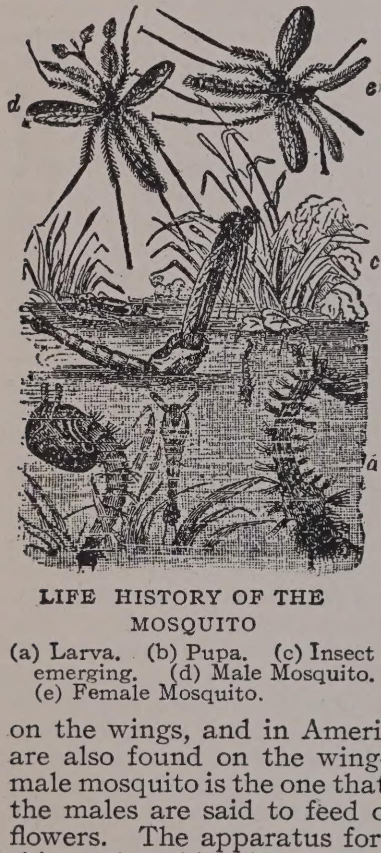
Mosby (*mōz'bĭ*), **John Singleton,** a noted Confederate soldier, was born at Edgemont, Powhatan County, Va., Dec. 6, 1833. He studied at the University of Virginia, and was admitted to the bar in 1855. At the outbreak of the Civil War he was practicing law at Bristol, Va. He entered the Confederate army as private, but soon became adjutant in the cavalry service, and by 1862 was colonel, operating an independent command whose special work was the cutting of communications between the Federal front and its base of supplies and capturing exposed cavalry outposts. The swiftness and daring with which Colonel Mosby operated made him greatly dreaded in the valley of the Shenandoah. At the close of the war he returned to the practice of law. He became a Republican and supported Grant for the presidency in 1872. He was appointed by President Hayes consul at Hong-Kong in 1878, where he remained on duty till 1885. He was removed by President Cleveland, and returning to the states made San Francisco his home. In 1901 he was appointed United States land-agent and assigned to duty in Nebraska. In 1887 Mosby published his *War Reminiscences.* He died 1916.

Moscow (*Mos'ko*), restored by the Bolshevists as Capital of Russia, in the center of European Russia on Moskva River, 403 miles southeast of Petrograd. It covers forty square miles. The Kremlin (citadel), in the center, is an inclosed space surrounded by walls with 18 towers and is the most sacred spot in the Russian empire. All who enter by the Savior gate must bow to the image of the Savior that stands above it. Inside the walls are three cathedrals, many churches and monasteries, the great tower, four palaces, an arsenal and the hall of the synod, with a fine library. The tower, built in 1600, is 270 feet high, commands a magnificent view of the city, and at its foot is the bell called King of Bells. Before the arsenal is a pile of 800 or 900 French cannon, the trophy of 1812. Outside of the Kremlin are the Cathedral of St. Basil (1554), the historical museum, the great bazar, the university, founded in 1755, with a library of 200,000 volumes and 4,497 students, and a public museum with fine collections, a picture-gallery and a library numbering over 300,000 volumes. Moscow is the busiest city in all Russia except Petrograd, and has numerous manufactures of cotton, silk and woolen goods, leather, tobacco, candles, carriages, pottery and matches. Its situation in the center of European Russia, between the Baltic and the Black Sea, makes it a great commercial market, and it carries on an extensive trade in grain, timber, furs, hides, tallow, tea, sugar and mineral products.

Moscow was first occupied by the Finns, and settled by the Russians in the 12th century. The Mongols sacked the town in 1237 and 1293, but by the 14th century it had become firmly established, and in 1325 became the seat of the church officers for central Russia. The Kremlin was built in 1300 and was walled in 1367. Moscow continued growing in influence and power, and in 1462 its prince, Ivan III, took the title of czar of Russia. In 1547 it was burned down; in 1571 it was taken and burned by the khan of the Crimea; and it suffered from the Mongols in 1591. St. Petersburg was made the capital by Peter the Great in 1713, but the old families and the peasantry still consider the holy city of Moscow as the real capital. The city suffered from fires again in 1739, 1748, 1753, and was finally, in 1812, set on fire and burned by its own citizens to save it from being taken by Napoleon. Since then it has been largely rebuilt. Population 1,468,563.

Moselle (*mō'zel'*), a branch of the Rhine, rises in the Vosges Mountains in France. It passes through Luxemburg and Rhenish Prussia and joins the Rnine at Coblentz. It is 315 miles in length, about 100 miles being navigable. Here the well-known sparkling wine, Mosel, is manufactured.

Mo'ses, the great lawgiver and leader of the Hebrew or Israelite nation, was born in Egypt, probably about the first half of the 14th century B. C. The Hebrews were under the power of the Egyptians, and lived in the eastern part of the Nile delta. His early life was spent at the court of Egypt, as the adopted son of Pharaoh's daughter, where he became learned in "all the wisdom of the Egyptians." Driven into the wilderness as a consequence of killing an Egyptian while protecting a fellow Hebrew from his cruelty, he spent 40 years as a keeper of flocks, until called back to lead his people out of Egypt. The story of the exodus, the 40 years' wandering in the wilderness, the giving of the law on Mount Sinai, the fixing of the ceremonies of the new religion, the patient endurance of waywardness and fickleness, until his solitary death and the unknown grave in Mt. Nebo, with only a view of the promised land to which he had led his people, is related in the first five books of the Bible, called the Books of Moses. See *Moses, His Life and Times*, by Rawlinson and Graetz's *History of the Jews*.



LIFE HISTORY OF THE MOSQUITO

(a) Larva. (b) Pupa. (c) Insect emerging. (d) Male Mosquito. (e) Female Mosquito.

Mosquito (*mŏs-kē'tō*), a gnat-like, two-winged insect, the female of which punctures the skin of man and animals and sucks blood. The names gnat and mosquito are often used interchangeably, but gnat has a wider scope. The mosquito is a form of gnat, but there are others, like the gall-gnat and buffalo-gnat, to which the name of mosquito will not apply. The mosquitoes are to be distinguished from all other kinds of gnats by having a fringe of scale-like hairs on the wings, and in American forms these are also found on the wing-veins. The female mosquito is the one that sings and bites; the males are said to feed on the sweets of flowers. The apparatus for puncturing the skin and sucking blood consists of six slender pieces, united in a case and forming a sharp stylet. These pests are distributed not only in tropical and temperate regions but, during the warm season, in Lapland, Siberia, Canada and other cold countries. In Alaska they are remarkably abundant and voracious. They abound in regions around the Lake of the Woods and drive hunters, horses and cattle to distraction with their bites. In the course of the year there are several generations. Some adults hibernate through the winter, and may be found in barns, cellars, cold garrets or under bridges. In the south the mosquito pest continues throughout the year. As a rule mosquitoes do not fly far, but they are carried by light, continued winds, and many are taken long distances on railroad trains The life-history of the common mosquito is as follows: The eggs, to the number of 400 or 500, are deposited by a single mosquito in the form of a float or raft in any standing water. The eggs soon hatch into wigglers or larvæ, which feed upon decaying matter in the water. The wigglers breathe by an air-tube in the posterior part of the body, and it is necessary for them to come to the surface for air every two or three minutes. The larvæ soon pass into a pupa-stage from which the perfect insect emerges. Mosquitoes have unusual interest to medical men, since it has been recently shown that they are connected with the spread of malaria, jungle-fever, Roman fever and yellow fever. The more common mosquito of the genus *Culex* does not carry malaria, but a closely-related form with spotted wings, belonging to the genus *Anopheles*, carries the contagion. Malaria is produced by a minute parasite (a protozöon), which lives within the red blood-corpuscles. When mosquitoes bite a person affected with malaria, they introduce into their own bodies many of these minute germs with the blood. There the parasites undergo a secondary development, and the infected mosquitoes, when *they* bite, carry the disease. This is the only known way of transmitting malaria. Yellow fever is also carried in a similar way. The disease is not transmitted by the clothing of the sick nor by contact with their bodies. To prevent the spread of these diseases it is important to get rid of the mosquitoes. Various means of combating them have been adopted, as draining marshy lands, introducing fish into the water, that feed upon the wigglers, and covering the surface of standing water with kerosene. The latter is the most effective. Oil dropped upon the water will spread as a film over it. When the wigglers come to the surface to breathe, the oil gets into their breathing-tubes and they are thereby killed. "In all mosquito-extermination," says Howard, "it must be remembered that they will breed successfully in any transient pool of water or in any receptacle where water is left standing for a week, no matter how small this receptacle. They may breed in collections of water in the hollows of old stumps, in old bottles or in old, discarded tomato cans. They breed profusely in rain-water barrels, in rain-water tanks, in old wells, even in cesspools where the adults are able to gain access to such pools. Therefore every possible source of this kind must be hunted for when one is engaged in mosquito-extermination." See Howard: *Mosquitoes;* Michell: *Mosquitoes* and *Practical Side of Mosquito Extermination* in Vol 23 of *Science*, pp. 379–85 (March 9, 1906)

Mosquito Coast, formerly an independent state under the protection of Great Britain, lies on the east side of Nicaragua, to which it now belongs. The land on the coast is swampy, but the mountain regions in the interior are healthy. The people are a mixed race, part Indian and part African, and number about 15,000. It was discovered by Columbus in 1502, and claimed by Spain. It was the home of the buccaneers in the 17th century, and subject to Britain from 1655 to 1850. The Mosquito Reserve (assigned to the mixed race of Indians) forms one of the departments of Nicaragua, and bears the name of Zelaya.

Moss. See Musci and Mosses.

Moss, Florida, Spanish or **Long,** a flowering, gray plant hanging from trees, found in tropical America and in the United States from Texas to Florida and eastern Virginia. The slender stem is often very long, the leaves narrow and scattered, the flowers small, inconspicuous, yellow. The gray drapery of the Spanish moss is a feature of our southern forests. It is used for packing, and sometimes is prepared for upholstery.

Moss, Sir Charles, was born at Cobourg, Ontario, in 1840. Called to the bar in 1869, he was an unsuccessful candidate for Parliament for one of the Ridings of Toronto in 1878. Engaged in very important cases in the High Court. In 1897 appointed a judge of the court of appeal. Has been vice-chancellor for several years of Toronto University. Appointed chief justice of Ontario in 1902. Administrator (in the absence of the lieutenant-governor) of the province on several occasions. A member of the board of governors of Toronto University. Member of the council of Wycliffe College; vice-president of Havergal Ladies' College. Received knighthood in 1907.

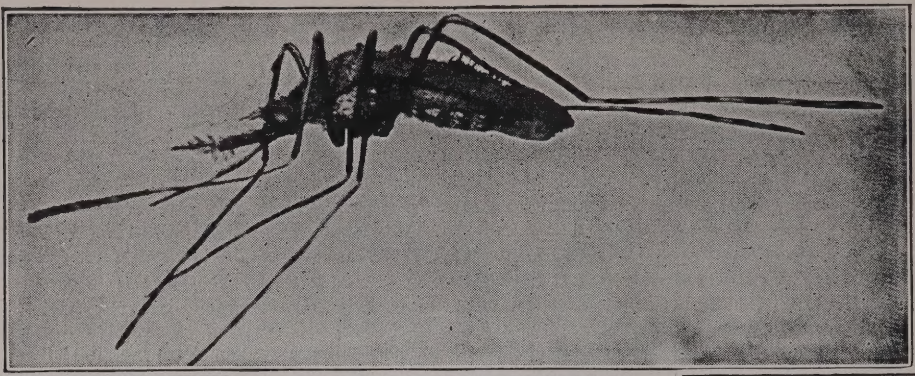
Moss'es, a large class of flowerless plants. Found in all climates, they are most abundant in temperate regions and arctic lands; though found in dry places, they are found submerged. There are two great groups: bog-mosses and true mosses. A moss-plant consists of a stem with leaves and roots. Roots will grow out from any part of the plant. The plant produces what are called moss-flowers, something like a bud, but which really are an egg-cell; from the egg grows another plant, which remains on the parent plant and produces spores or seeds, when usually the mother-plant dies. In mountain regions there are thick beds of moss which soak up the rain and often prevent floods. The beds of moss which are seen growing to-day in bogs are the tips of plants which began life thousands of years ago, and have formed great beds of peat 20 feet thick. There are about 3,000 species of mosses. Irish moss is not a moss, but a seaweed, and Iceland moss is a lichen. The moss on trees is mostly lichens. Florida or Spanish moss is a flowering plant. See Musci.

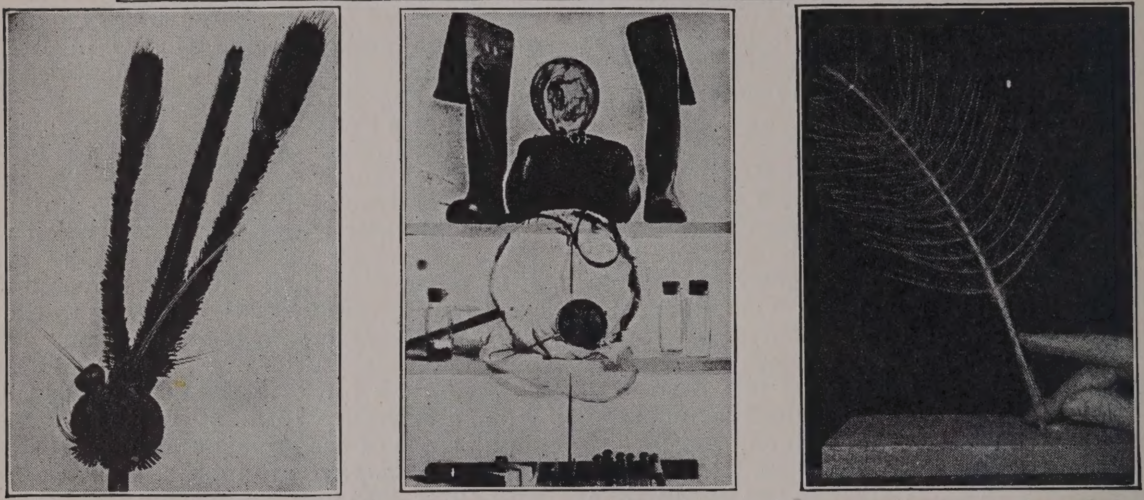
Mother Goose. This name, familiar in connection with nursery rhymes, is of uncertain origin. *Tales of Mother Goose* was the title of a series of French stories as early as 1697. *Mother Goose's Melodies* was the title, again, of some nursery rhymes written by Elizabeth Goose in Boston in 1719. A set of rhymes was published for children by Newbery about the middle of the 18th century called *Mother Goose's Melody.* In 1826 appeared *Mother Goose's Quarto* in Boston. Thus the name has come to be identified with nursery rhymes in general.

Mother's Pensions. See Pensions.

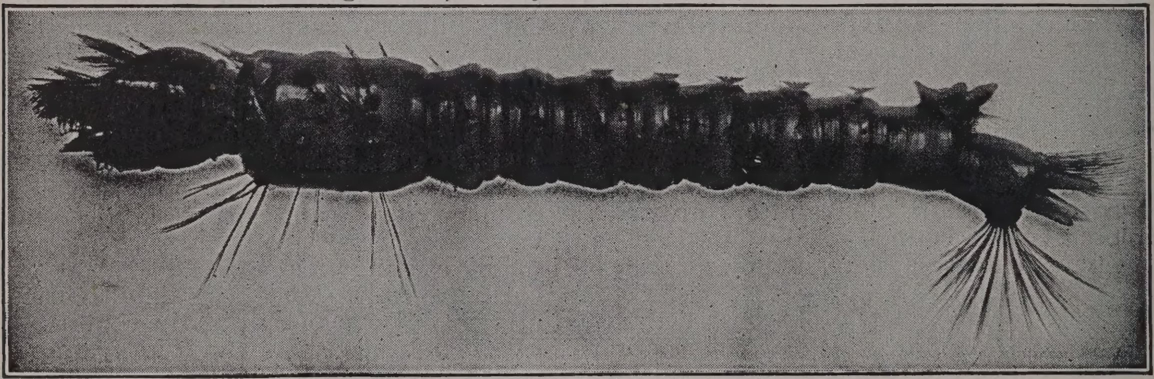
Moths, insects closely related to butterflies, but flying mostly at night. They usually have thread-like or feathery antennæ, and hold their wings nearly flat when resting; butterflies usually hold theirs erect. Like butterflies, their wings are covered with scales, and, therefore, they belong to the order of *Lepidoptera.* There is a general impression that moths are smaller and more somber than butterflies, but, though this is true in reference to many moths and "millers," some of the largest and most beautiful of the *Lepidoptera* are moths. The *Cecropia* and *Promethea* moths are large and beautiful forms with bright colors and eye-spots on their wings. The *Luna* moth, of a pale-green color, with eye-like spots having a transparent center on each wing, is especially attractive. The hawk-moths, coming from larvæ like the tomato-worm, are examples of large moths. Among the best known moths are the silk-worms, whose cocoons supply most of the silk of commerce. Some of the smaller forms are very destructive to furs, woolen cloths and other fabrics. Many larvæ are destructive to crops and trees, annually causing great loss. The army worm cotton worm, tobacco worm and tent caterpillars are larvæ of moths; the codling moth, sphinx moth, grape-berry moth, grape-leaf folder, plume moth, tussock moth and others work much ruin. The sphinxes or hawk moths are very beautiful but also very baneful. They are large and narrow-winged, visit flowers at dusk, frequently are mistaken for humming-birds. The larvæ, which are very large, work much havoc on the grapevine, feeding upon the leaves; it is said that a single larva may strip or kill a grape-vine in two or three days. The moths appear in July, laying their eggs underneath grape-leaf or leaf of Virginia creeper. The plume moth is another enemy of the grape. Often one sees young grape-leaves curled up in little balls, examination of which will disclose the greenish-yellow larvæ of the plume moth.

OUR WAR WITH THE MOSQUITO

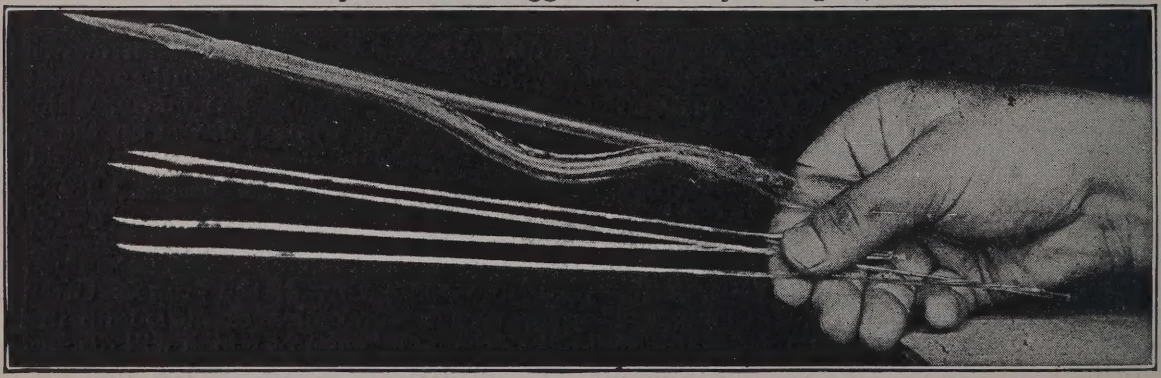




First picture shows head, feelers and lance of female mosquito; on the right, "whiskers" of male mosquito, supposed to be an organ of hearing; in the center, a doctor's outfit for catching swamp mosquitoes for study.



Mosquito larva wriggler. (Greatly enlarged.)



Mrs. Mosquito's surgical instruments—a lance and four little saws.

The vines should be examined daily, and the larvæ picked off and destroyed. In combatting the grape-leaf folder the same means should be employed. The white-marked tussock moth works much ruin on shade and fruit trees, stripping them of foliage. There are two broods a year. The cocoons are made in the trees, and on the cocoons the eggs are laid in a white, frothy mass. These eggs are conspicuous, and should be gathered and destroyed. See ARMY-WORM, BUTTERFLY, CARPET-BEETLE, CATERPILLAR and CODLING-MOTH. Consult Hodge: *Nature-Study and Life;* Holland: *The Moth Book;* and Treat: *Injurious Insects.*

Mo'tion, Laws of, generally the three great generalizations in which Newton described the effect of forces upon bodies. See DYNAMICS where these laws are stated. Compare, also, *Newton's Laws of Motion* by P. G. Tait for an extraordinarily clear, brief and elegant discussion of this subject.

Mot'ley, John Lothrop, an American historical writer, was born at Dorchester (now part of Boston), Mass., April 15, 1814. As a boy he had Bancroft for a teacher. His higher education he obtained at Harvard and in German universities, where he made a friend of Bismarck. His first great work, *The History of the Dutch Republic* (1856), was the result of nearly ten years' labor, much of the time being spent in Berlin, Dresden and The Hague in searching for materials. It was translated into Dutch, French, German and Russian, and established his fame. His room is shown to visitors in the queen's palace at The Hague, where he worked by royal invitation. *The History of the United Netherlands* followed in 1860 and 1868. His last work was the *Life and Death of John of Barneveldt*, which is still another contribution to the history of Holland. His plan embraced a *History of the Thirty Years' War*, which was not finished. He also was a contributor to the *Atlantic Monthly*, and his letters to the *London Times* during the Civil War were effective in giving to the English people an understanding of the real question involved. He was United States minister to Austria from 1861 to 1867 and in 1869–70 minister to England. He died at the home of his daughter, who had married Sir Wm. Vernon Harcourt, in Dorsetshire, England, May 29, 1877. See *Memoir* by Oliver Wendell Holmes and *Letters*, edited by George William Curtis.

Mo'tor is any mechanical device by means of which energy is converted into motion. A windmill, used for driving a wheel or working a pump, is sometimes called an aëromotor. A machine by which the pressure of water in city mains is made to operate mechanical devices is usually called a water-motor Motors for the use of compressed air have of late years been much used, especially for the propulsion of street-cars. But the name is now most frequently applied to devices for the conversion of static into dynamic electricity. Motors operated by electricity have been devised to propel everything from a bicycle to a locomotive. Electric power is sometimes conveyed to the motor from a waterfall and sometimes from a storage battery. In any simple electric motor one finds a field-magnet, consisting of various coils of insulated wire on soft iron cores. These are connected by a yoke; and lines of force are developed around the pole pieces when a current of electricity is run through the coils. Within these lines of force rotates the armature. Of late, through improved devices, power is conveyed long distances as from Niagara Falls (*q. v.*) to Buffalo; and power is conveyed to thousands of motors which operate innumerable mechanisms at a distance from the source. The discovery that natural forces can be made to store electric forces, which may in turn be reconverted into dynamic electricity at the other end of the wire by means of an electric motor, is one of the greatest discoveries of the 19th century

Mo'tor Or'gan (in plants), a term applied to a portion of the leafstalk (petiole) which is sensitive to certain stimuli (see IRRITABILITY) and has a special structure enabling it to curve easily. Motor organs are most perfect in the bean and oxalis families, but exist also in some spurges (*Euphorbia*), the common mallow (*Malva rotundifolia*) and the velvet leaf (*Abutilon Avicennæ*). To the eye the motor organ usually is of a different color from the rest of the leafstalk, and either larger or smaller. If the leafstalk is long, the motor organ will be at the base; if short, the whole stalk may be a motor organ. In compound leaves there may be motor organs at main and secondary (and even at tertiary) petioles. In contrast with the rest of the petiole the woody parts of the motor organs are gathered near the center, and the whole of the surrounding tissue is made of thin-walled cells. When their turgor (which see) increases on one side and decreases on the other, the motor organ becomes curved, carrying the leaves into a new position. See MOVEMENTS.

Mott, Mrs. Lucretia Coffin, an American Quaker, was born at Nantucket, Mass., Jan. 3, 1793. She became a preacher and traveled through New England, Pennsylvania, Maryland and Virginia, preaching the Quaker doctrines and opposing intemperance and slavery. She was active in organizing the antislavery society at Philadelphia in 1833, and proceeded as a delegate to the world's antislavery convention at London in 1840. She was also prominent in woman's rights assemblies. She died on Nov. 11, 1880.

Mould (among plants). See Phycomycetes.

Moulting. See Molting.

Mound-Build′ers, the name given to the supposed race whose works, known as earthworks, are found in America, largely in the shape of mounds. There are many theories in regard to them. Some believe them to be the same as the American Indians, the ancestors either of the more civilized Indians found in the southern states or of the Aztecs in Mexico. Others consider them to have been a superior race, of whom nothing is known except these curious remains. From the contents of the mounds their builders seem to have been passing from the stone to the metal age, familiar with copper but possessing chiefly weapons and tools of stone. Some of the mounds seem to have been used as burial-places and others as temples. They are found in the Mississippi valley and in other parts of North America, but most extensively in Ohio, Indiana, Illinois and Missouri. They are mounds varying from 6 to 25 feet in height, though some of the temple-mounds reach higher. One in Illinois is 90 feet high and measures 700 by 500 feet at the base. They usually have a ditch around them, and often are in an inclosure, with low earth-walls and connecting passages, as one at Newark, O., which covers more than two square miles and has about 12 miles of embankments from 2 to 20 feet in height, and another at Marietta, O., covering a large square, with double walls inclosing a passage to the river. When used as burial places, the mounds rarely contain more than one skeleton. There also are curious figures of animals; one in the form of a serpent, 1,000 feet long and about five feet high, was discovered in Adams County, O. The period when the mounds were built is variously estimated. The Indians found in North America, when settled by Europeans, were very much behind the mound-builders in their arts of living, judging from the remains found. The large trees growing on the mounds are another indication of their age; and the fact that they are never built on the lowest formed river-terraces, is thought to be another proof of their great age, which is estimated at from 1,800 to 2,000 years. See *Ancient Monuments of the Mississippi Valley* by Squier and Davis; *Antiquities of Ohio* by Shepherd; and *Antiquities of Tennessee* by Thurston.

Moun′tain Sheep, wild sheep that dwells in the "bad lands" and high on the mountains. It is persistently hunted, its flesh is valued and its massive, circling horns are coveted as trophies. Steepest crag it can climb, and dash at great speed down steepest declivity, wonderful stories being told of its agility and feats of endurance. Six species are found in North America, scattered through the mountains from Mexico into Alaska. The best known is the bighorn, often called the Rocky Mountain sheep; but it has been slaughtered so ruthlessly that its numbers are fast decreasing. A large ram sometimes weighs 300 pounds. The general color is gray-brown, with a light yellow patch on the hindquarters. The horns of one specimen are said to have measured 52½ inches in length, with a basal circumference of 18½ inches. The white mountain-sheep is found in various portions of Alaska. See Hornaday's *American Natural History*.

Mount Car′mel, Pa., a borough in Northumberland County, in eastern central Pennsylvania, 28 miles east of Sunbury. It lies in the anthracite region, on the Lehigh Valley, Pennsylvania and Philadelphia and Reading railroads. It has three banks, a shirt factory, stocking factory, foundry and planing mill. The town has gained about 5,000 inhabitants in the past decade, its present population being 17,532.

Mount Holyoke (*hōl′yōk*) **College,** a college for women at South Hadley, Mass., founded by Mary Lyon. It was chartered in 1836 as Mount Holyoke Seminary, and was long maintained under this name as a seminary of high grade. In 1888, it was rechartered as Mount Holyoke College and the institution was placed in educational facilities and requirements on a standing with the colleges for young men. It has a faculty of 89 and the students number 785.

Mount McKinley is in south-central Alaska, 150 miles north of the head of Cook's Inlet. It is surrounded by irregular mountains of much inferior height, from among which it towers 20,464 feet above sea-level, the highest peak of North America. It is covered with snow, and down its sides creep many great glaciers.

Mount Ver′non, N. Y., a flourishing city in Westchester County, southeastern New York, on the Bronx, 14 miles north of New York City. It is served by the New York Central and Hudson River and New York, New Haven and Hartford railroads. The town is prettily situated, and commands a fine view of Long Island Sound. It includes part of Eastchester and of Chester Hill, and has almost doubled its population in the past decade. It is largely occupied by New York business men as a place of residence. There are many fine churches and schools, a Carnegie Library, Mount Vernon Hospital, the Lucas Building, a postoffice, banks and an opera-house. It has a few industries, including manufactures of pens, rubber, jewelry and carriages. It has electric connection with New Rochelle, Yonkers and a number of other towns in the vicinity. Population 50,000.

Mount Vernon, the home and burial place of George Washington, is situated on the Potomac River in Fairfax County, Virginia, fifteen miles below Washington, D. C. The estate originally extended over several thousand acres. In 1743, Lawrence Washington built the mansion on an eminence overlooking the beautiful Potomac. The name of the estate had been Hunting Creek, but Washington changed it to Mount Vernon, in honor of Admiral Vernon under whom he had served in the West Indies. His younger brother, George Washington, inherited the estate upon the death of Lawrence and his only child. Shortly after his marriage to Martha Custis, George Washington came here to live in 1759. Upon his death the estate was left to a nephew.

In 1855 the estate was offered for sale, as the descendants were unable to continue in maintaining it. The Ladies' Mount Vernon Association was formed, and money raised with the assistance of such men as Edward Everett Hale and Washington Irving. In 1859, the house and 200 acres of the estate around it were purchased. The organization for its care, comprised a regent and a vice-regent for each state in the Union. The care of the estate was allotted to the various states, and their coat of arms displayed in the respective rooms. The buildings were repaired very carefully and used as a national museum for Washington and colonial relics. The grounds are kept in beautiful condition, and the quaint boxwood hedges, and the trees that Washington himself planted, are most carefully preserved. The famous Mary Washington rose, named by Washington for his mother, still blooms. A willow, from Napoleon's grave at St. Helena, flourishes on the grounds. In 1831 the remains of Washington were removed from the family vault to a plain brick tomb in accord with his will, and rest there near a wooded ravine a short distance from the house. Much of the family furniture has been preserved and is still in the mansion, with intimate relics of the lives of the Washingtons and their friends, including Lafayette. Mount Vernon contains the most complete exhibition of colonial furniture in existence. This mansion with its priceless treasures belongs to the nation, and is guarded as a permanent shrine.

Mouse, a small gnawing animal closely related to the rat. The common house-mouse originally was an inhabitant of Asia. "From there they have accompanied man in his wanderings to all parts of the world, travelling as he has travelled in ox-teams and on the backs of donkeys, by steamship and railway; taking up their quarters wherever he does, first in log-cabins with thatched roofs and finally, in some instances, on the nineteenth floor of a steel-building where generation after generation may live and die in turn without so much as having set foot to the earth." They breed at all times and seasons, multiply with great rapidity, and have to be treated as a pest. In almost all houses of any age, mice live between plaster and wainscotting, with their runways as a rule leading throughout the house. Besides the house-mice there are various kinds of field and meadow mice. The harvest-mouse of Europe is very small, being between two and one-half and three inches long. It lives among grasses and in cornfields, where it builds a globular nest about the size of a cricket-ball, in which its young are reared. The American field-mouse differs from the house-mouse in having a blunt nose, short limbs and tail. When abundant they are great pests to farmers. In 1890 the wheat crop in South Australia was almost completely ruined by field-mice. The field-mouse ranges over our entire country. It feeds on roots, grasses and grain and does considerable harm in fields of Indian corn. In severe weather the mouse damages young fruit trees by stripping their bark close to the ground. For the young a simple burrow is dug, with a nest at the bottom. Among the enemies of the mouse are hawks, owls, crows, foxes, cats and weasels. The American harvest-mouse belongs to the South. The rice-field mouse also is a southern animal. It is aquatic in its habits and is found chiefly on the banks of rice-fields and in coast-marshes. Widely distributed in this country, especially common in the West, is the interesting white-footed mouse, deer-mouse, or wood-mouse. It is fawn above, and white or light grey underneath. Its black eyes are large and very brilliant, and its feet are snow-white. Pure white mice are called albinos or sports. Their white offspring, and other "fancy mice"—black and white, yellow, black, brown, mauve and blue—are prized as pets; many become very tame and take readily to training. The following food is recommended for them: raw oatmeal in winter and a little on cool days in summer; bread; bird-seed or cooked potatoes; some salt. The cages should be kept scrupulously clean. Bits of tissue paper or newspaper make suitable nests.

Movements, botanically speaking, movement from place to place is possible only to the simpler plants and those living in water or on wet surfaces. To accomplish such movement, the protoplasm is either extended into one or more slender threads, called cilia, which bend quickly and act somewhat as oars; or into broad, blunt protrusions by means of which the cells creep. The method of some movements is still unknown. Movements of larger plants are due to bending. This may be done by unequal growth on different sides or by unequal turgor on the opposite sides. Motor organs are those regions of the leafstalk specially arranged to permit curvature by the latter method. Movements are usually executed in response to some stimulus, although some seem to be spontaneous.

See IRRITABILITY; CHEMOTAXIS; CHEMOTROPISM; GEOTROPISM; HELIOTROPISM; HYDROTROPISM; PHOTOTAXIS; RHEOTROPISM; THERMOTROPISM.

Mowat (*mou'ăt*), **Sir Oliver,** a Canadian legislator, was born in Kingston, Ontario, in

HOW MOVING PICTURES ARE MADE

The following illustrations show the principles and mechanisms referred to in the foregoing article.

Picture 1 illustrates the principle of optical illusion. Each of the little figures is in a slightly different position from the other. When one disk is turned and the figures are looked at through the slits in the other the figures seem to be jumping a rope. This is because one image remains in the eye while another image, showing the arms and legs in a slightly different position, is added, thus causing the figure to seem to move.

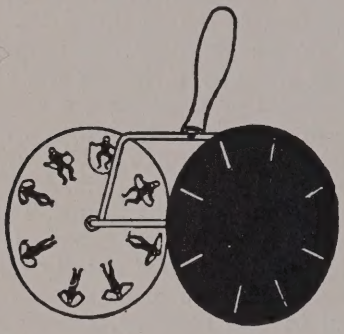


Fig. 1

To make moving pictures show clearly and distinctly on the screen it is necessary that each succeeding photograph be held in exactly the same position as the preceding photograph. Notice (Fig. 2) that the films have holes on either side. Into these holes fit the teeth of a wheel. As the wheel is turned these teeth catch in the holes, draw the film from the spool and hold each picture in position before the lens at the very spot where the preceding picture stood.

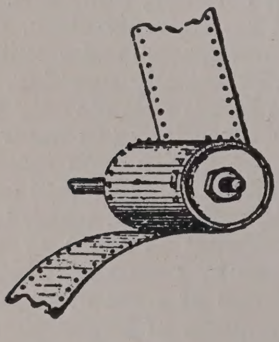


Fig. 2

Figure 3 shows the machine which punches these holes in the film. The film is fed into the machine from the left and is held steady by two small rollers, one of which you see in this end view of the perforating machine. The film is drawn along by a sprocket wheel—that is, a wheel with teeth like the sprocket wheel on a bicycle. These teeth fit into the holes in the film, as fast as they are made.

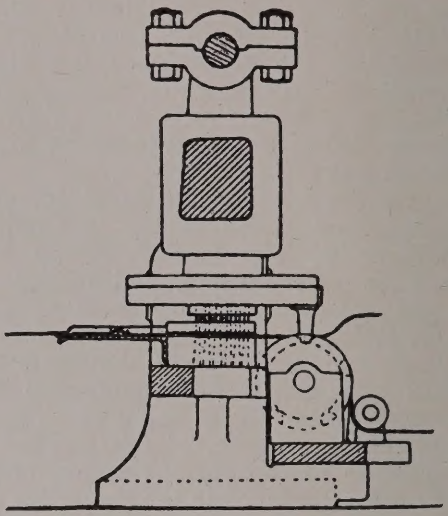


Fig. 3

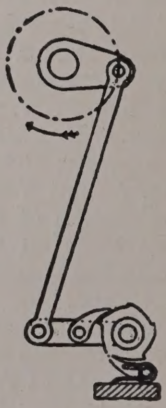


Fig. 4

Figure 4 shows how the wheel is stopped each time, after it has turned the length of one film. This stopping device is called a ratchet gear. You have seen ratchet gears on windlasses. Whenever the wheel stops a tooth drops into a hole in the wheel and holds it while the film is being perforated.

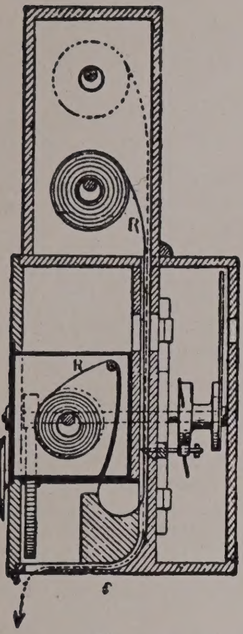
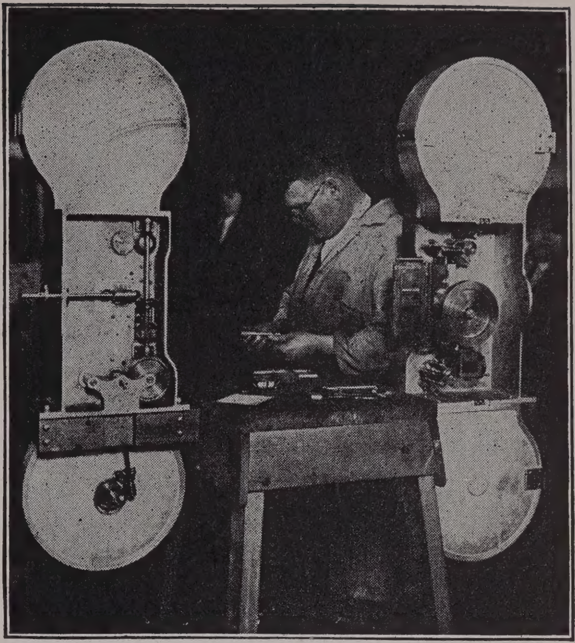


Fig. 5

After the development of the negatives comes the printing. The printing requires even more care than the development of the films. If the films have been stretched or if the pictures are not kept at exactly the same distance apart in printing, the pictures, when thrown on the screen, will have that trembling motion and blurred appearance which is so disagreeable and so hard on the eyes. Figure 5 shows a Cinematograph machine printing positives on a film R. The negative is wound on the upper spool. The film passes into a box. This box is a "dark room" that admits light only at the point where the two films pass. As they pass this little window the picture on the negative film is printed on the positive film, just as the sun prints photographs exposed in a frame.



Above is shown the new "Natural Vision, life-size, third dimension" projector. The positive films pass before the shutter of this machine in the same manner the negative films pass through the camera. The powerful light behind the film projects the shadows of the film on the screen.

An Indian fight in the desert. One of the striking scenes in "Crimson Days," as seen from the angle of the cameraman and Cliff Smith, the director of the Universal Jack Hoxie feature.

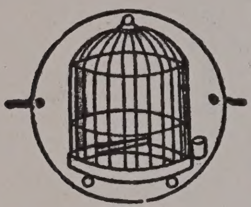
THE WONDERS OF THE SILVER SCREEN

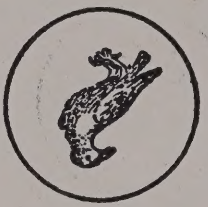
In the World of the Cinema or Moving Picture

BEHIND THE SCREEN OF TIME

Deceiving the Eye

Today when you go to the moving picture theatre you enjoy the luxury and art of an enterprise less than half a century old. Before the year 1900 no one ever dreamed of the modern photoplay or "silent drama." Yet the whole achievement of the moving picture rests upon a peculiar quality of your eyes. The eye sees an image one-sixteenth of a second after the image has vanished. In other words, the picture of the image stays in the mind as visible a very short time after it is, in fact, invisible. This peculiar nature of our apparatus of sight was known to the ancient Romans before the birth of Christ, when Lucretius first noticed it. Later a Greek, Ptolemy, demonstrated the principle by revolving a card upon which he had painted a series of black dots in the form of a circle. When the card was revolved, the dots appeared to be a continuous black line. If a cage is painted on one side of a small circular piece of cardboard, and a parrot is painted opposite the cage on the other side of the center, the parrot will appear to be inside the cage when the cardboard is revolved. This is an illusion caused by the fact that the image of the cage is still in the mind when the revolving cardboard has placed the image of the parrot where the cage was less than a sixteenth of a second before.





Progressive Experimentation

No one ever thought of applying this principle for the pleasure of people until hundreds of years after Lucretius and Ptolemy. In 1825 a toy manufacturer, learning of this illusion of the eye, applied it to his business, making a series of cards which could be turned swiftly before the eye. The same picture was on each card except that the position of the image was slightly shifted. By moving the cards swiftly the image of a person could be made to "walk" across a room, or a dog bite a man. About sixty years later a series of pictures painted on a glass slide and pushed through a stereopticon machine gave an audience a crude moving picture.

Eight years after the civil war—in 1872—an Englishman was able to take a series of photographs of a horse race by clicking a series of cameras arranged near to each other; beginning at one end, each camera in turn took a picture immediately after the camera before it. These pictures were on glass plates. It was not until 1889 that the celluloid film was invented. This invention gave W. F. Greene and M. Evans an idea: they would make one camera take a series of pictures. When this camera was invented many men in Europe and America began to improve upon the idea. In 1893 Thomas A. Edison patented his kinetoscope. One person at a time looked through a "peep hole" and saw the moving pictures inside.

One of the first "producers" was Lubin, a photographer at Philadelphia. He arranged a small studio in his back yard and took pictures which were later exhibited in vaudeville houses. The pictures were of the humorous type, featuring fat men and "slap-stick" situations. Such was the moving picture of 1902. But producers now began to realize the vast opportunity ahead for them, and the moving picture soon expanded its scope.

THE WORLD IN THE MOVING PICTURES

Theatres and Companies

Today between eight and ten million persons attend moving picture theatres weekly in the United States. There are about a quarter of a million "movie" theatres in this country, and over two hundred film producers in the purely dramatic field. Producers have spent over one million dollars on one production. There are companies in Florida and Arizona, and many other states, but the two greatest areas of picture production are southern California and the region of New York City, including northern New Jersey. Hollywood, in southern California, has become the largest in the world.

The Photo-Drama

The first picture dramas were very crude, and many people were rather disgusted with the "movies." As conditions improved, however, the photodramatic qualities became better understood and today many excellent dramas appear in the moving pictures. At times certain plays of the legitimate or speaking stage are adapted to moving pictures, as well as many novels. There are certain types of plays which can be produced better by moving pictures than by the speaking stage, especially plays requiring many groups of people, broad and changing scenery, action rather than dialogue, and expensive scenic effects. On the other hand, there are certain plays which the moving pictures can not produce: plays of wit, repartee, dialogue of discussion, mental reactions, subtle altercations of many types. It is useless to argue the value of the silent and the spoken dramas; each has its field, and some photoplays adapted from the speaking stage have been absolute failures.

Educational Pictures

Moving pictures have entered the school rooms, and have been serviceable in instruction. How well a moving picture may teach many lessons in geography. The cities, farms, animals, and plants of all nations can be brought to one room for exhibition; the glaciers of Alaska and the harbors of Iceland, the jungles of India and the Amazon, the mountains and valleys of the world can be shown in the space of a single school period.

Natural history can be studied by the use of moving pictures perhaps better than any other way. The wonderful life of the bee has been caught through magnifying lenses and several thousand feet of film used to illustrate his habits of existence. Beneath the sea the camera man has gone, and he has given us marine pictures which, if it were not for the cinema, we would never see.

Science and Medicine

The camera has been developed to aid scientists in studying things they could not learn otherwise. There are stars in the sky which have been photographed and magnified which we can not see with our eyes. The X-ray has made the interior of our bodies visible. Frequently, through highly developed photography, the moving picture camera has been of aid in studying swiftly moving objects. A camera has been developed which will take 5,000 pictures a second. With it the course of a bullet can be clearly noted. Bacteria invisible to the eye have been photographed, so that the actual course of a disease may be seen.

THE PLAY AND HOW IT IS PRODUCED

Scenario Writers and Directors

Just as newspapers and magazines have editorial departments, the picture-producing companies have scenario editors. It is the business of the scenario editor to write stories, or scenarios, and to rewrite books, plays, and adaptable scenarios so that they can be produced. When the scenario editor has finished a manuscript, he gives it to the director, who reads it, orders the stage properties, settings, and costumes, selects his cast, and posts the names of the actors upon a bulletin board, stating the time they are to appear.

Mixing the Acts

Unlike a drama played by speaking characters, a photoplay is seldom produced in the order of scenes you see in the moving picture theatres. If a certain setting is used in the first part of the picture and again near the close, the director arranges the process so that the actors play both these scenes before they do the intervening parts. This saves the trouble of building the same setting twice. Besides, some other director may be in need of the different setting painted on the back of the setting used by the first director.

Make-up and Lights At the time appointed the actors appear, and rehearse their parts with the advice of the director. The faces of the actors are heavily painted and lined, for great electric lights may be necessary to give the proper lighting effects. An unpainted face, photographed in such a glare as is used when interior scenes are taken, would look hideous. When all is in readiness, the director signals to the photographer, who begins taking the pictures. With a megaphone, the director calls his directions to the players.

THE SCIENCE BACK OF THE PICTURE

The Camera The camera, rectangular in shape, is constructed so that it will take a series of individual pictures. The film is carried in a light-tight reel, and passes before the lens of the camera in a series of jerks. The film is one and three-eighths inches wide, and each picture is three-fourths of an inch long. On both sides of the film are a series of holes; sprockets catch their teeth in the holes and pull the film through. Each picture is separate—a distinct photograph. As the film passes across the lens it stops an instant, the shutter opens, and an exposure made. The shutter closes, the film is moved three-fourths of an inch and again stops an instant while the shutter opens. Thus, although the film is moving quite fast, it is passing in what really is a series of jerks. The pictures are taken so rapidly that a foot or more of film may be taken while a man is taking a single step.

The Film After the pictures are taken the film is developed and fixed just as an ordinary film used in a kodak. See *Photography*. The light places on the scene, however, appear black on the developed film. For instance, a white ghost appears black on the film. For this reason, the film is called a negative. Only positive films are used by the moving picture theatres. The original negative film is, therefore, placed over an unexposed film, and exposures are made. The second film is a positive film, because the black areas of the original film appear white or transparent on the second film. The positive film is developed and fixed, and is then ready for shipment. Many positive films are taken from the original negative, and by this means the same photodrama may be shown in various cities at the same time.

The Projecting Machine The projecting machine used in the theatres is like a stereopticon. A brilliant light is caused to pass through the film, is magnified by the lens, and brought to focus upon the white sheet in front of the audience. What is dark on the film will produce a shadow upon the screen, and thus images are produced. The film is wound in front of the light in a series of jerks. As each single picture appears in position, the film stops for a fifteenth or a sixteenth of a second, a shutter opens, and light is admitted on the screen. The shutter then closes, hiding all light from the screen until the next picture is in place; then the shutter opens again.

The Eyes of the Audience Since each picture is three-fourths of an inch long, there are sixteen pictures to each foot of film. The film is run through the projector at the rate of a foot a second, or slightly faster. Thus sixteen distinct pictures are thrown on the screen each second. Since the eye retains images one-sixteenth of a second after they disappear, the sixteen pictures each second give the illusion of a single, continuous, moving image.

TRICKS OF THE TRADE

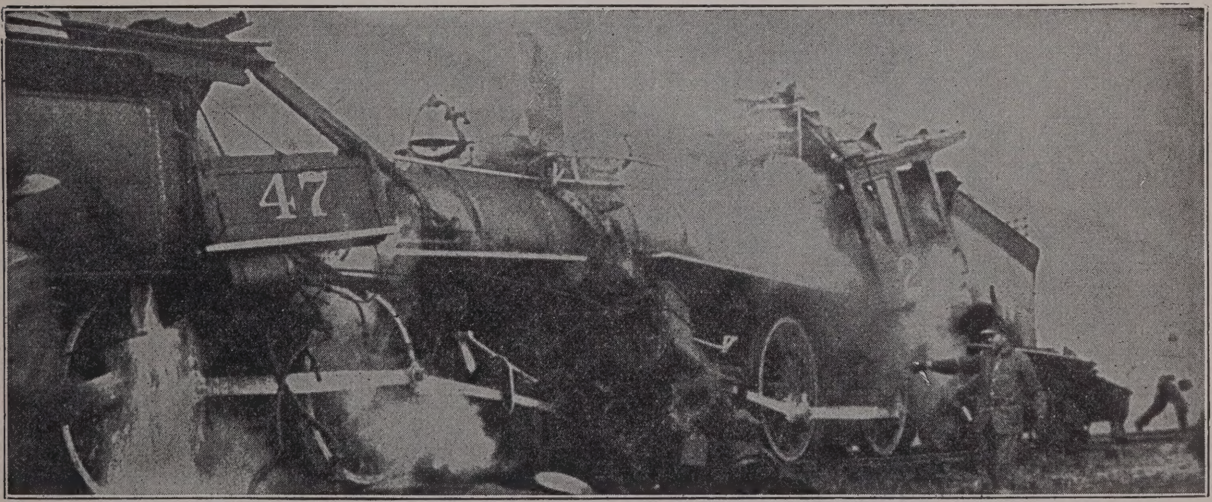
Many seemingly impossible feats are easily accomplished. For instance, a picture of a man jumping backwards out of a tree to the ground fifteen feet below, when reversed, produces the same man apparently doing the impossible feat of jumping fifteen feet in the air to a branch of the tree.

A narrow escape from a railway train is also photographed while the engine is actually moving backwards away from the person or automobile. When reversed, the picture at the theatre shows the train apparently moving forward, rushing upon the victim.

Pictures of dreams transpiring on the wall of a room are really taken on a separate piece of film, super-imposed on the major film, and from them the positive film is taken.

A company in California may make a picture including some famous European buildings without ever going near the actual structure. The building is merely painted in miniature, and held a few feet in front of the camera. On the screen the small miniature looks like the huge original. If some characters are supposed to enter the building, the entrance is blotted out of the miniature. A separate strip is taken of the characters entering an imitation entrance, and this strip is super-imposed upon the strip carrying the miniature picture of the whole building. By super-imposing, also, a whole background may be painted. For instance, suppose the background requires hills, valleys, and trees, while the company is actually on dry, level territory. The actors produce the picture. Then the background is built in. On a square piece of glass several feet long, hills, valleys and trees are painted. This glass is filmed separately and becomes the background of the picture.

Moving cartoon pictures are very interesting, and really require much work, for about three or four thousand separate drawings must be made for a thousand feet of film—the usual length for such pictures. Of course, with sixteen exposures to the foot, more than four thousand pictures are necessary, but many are repeated, and many are slightly changed, which saves work.



Courtesy of Technical World

Film makers go to great expense and trouble in making the films which cost you only five cents to see. This picture shows a head-on collision of locomotives taken for a moving picture company, which occurred at Indianapolis on July 4, 1911, and was arranged by the Society of American Engineers. There was an engineer in charge of each locomotive. After opening the throttle and sending the locomotives toward each other at the rate of sixty miles an hour, the engineers jumped from their cabs.

1820. He studied law with Sir John A. Macdonald and was called to the bar in 1842. A member of the Quebec Union Conference in 1864, he was Vice-Chancellor of Upper Canada from 1864 to 1872. In the latter year he was called on to form a government in which he became Premier and Attorney-General. He was counsel for Ontario before the Privy Council in England in the Ontario-Manitoba boundary case, and was admitted to be high authority on all questions pertaining to matters of Provincial or Dominion jurisdiction. He remained Premier of Ontario until 1896, when he resigned to take office as Minister of Justice in the Laurier Government. He was appointed to the Senate in 1896. Distinguished as one of the most successful of Canadian statesmen, he closed his public career as Lieutenant-Governor of the Province. He died at Toronto in 1903.

Mozambique (*mō'zäm-bēk*), Portuguese East Africa, is situated on the eastern coast of Africa just south of Cape Delgado, and just north of the Union of South Africa. It is bounded on the west by the Union of South Africa and Rhodesia, and on the north by Tanganyika, of which territory it received the Kionga Triangle, more than 400 square miles in area, in 1919 when this formerly German country became a British possession. The area of Mozambique is 297,657 square miles. Lourenço Marques, and Beira are the chief ports. Railway transportation facilities are being rapidly developed. There are coal deposits, and vast natural resources which are practically untouched. The chief products are sugar, coconuts and beeswax. Rubber, ivory, gold and other ores are also produced in smaller quantities. The population of Mozambique in 1930 was 3,995,831, including 35,570 Europeans. Lourenço Marques, the capital, had a population of 42,779 in 1931.

Mozart (*mō'zart*), **Wolfgang Amadeus Chrysostom,** the great musician, was born at Salzburg, Germany, on January 27, 1756, a son of Leopold Mozart, Kappellmeister to the archbishop of Salzburg. When he was only six years old, his father took him and his sister on a musical tour through Europe. In Bologna, then the great center of music in Italy, the Philharmonic Society elected him for membership when he was but fifteen years of age, in spite of its rule that no one under the age of twenty should be admitted. The Easter music in the Sistine Chapel was jealously guarded and no copy allowed to be made, but young Mozart, hearing it once, wrote it out from memory. In 1781 he lost his position in the court of the archbishop with whom he had gone to Vienna. He married Constance Weber in 1782. A short time later he produced two operas, one of them *The Marriage of Figaro,* which created a furore. He was commissioned to write an opera for the theater in Prague. The summer-house in which he wrote this opera, *Don Giovanni,* and the little stone table on which he composed it, are still shown in the gardens at Prague. The great success of this work made it impossible for the court to overlook his merits longer, and he received an appointment from the emperor with a small salary, his duty being to supply the dance-music at the imperial balls. He struggled with debt, mistaken loyalty preventing him from leaving the service of the emperor when offered a better position in Prussia. A friend, a theater-manager in financial difficulties, induced Mozart to come to his aid with a new opera, and in March, 1791, he began his *Magic Flute.* It was produced in September, and made the fortune of the lucky manager. While he was at work on this opera, a stranger visited him and commissioned him to write a requiem mass, to be finished within a month. He imagined there was something mysterious about the order, and felt that he was writing the requiem for himself. He was near death, and on December 4, 1791, when a few friends met to rehearse the part of the work that was finished, he was unequal to the effort, although even when he was unconscious, he seemed to be occupied with his work. He died that night at Vienna, and was buried in the churchyard. When his wife tried to find the grave a few days later, no one could tell her where it was. Many years after his death a monument was dedicated to his memory. Mozart wrote 624 compositions. In opera and symphony his works are surpassed by none. His three great operas, *Don Giovanni, The Magic Flute,* and *Figaro,* still hold the stage, and three of his forty-one symphonies will always be enriching to music lovers the world over.

Muckers (*mo͝ok'ērs*), adherents of a religious sect which sprang up in Königsberg, Prussia, in 1835. It was a mystical and theosophical sect, the members of which embraced the views of Henry Schönherr (1771-1826) regarding the origin of the universe by a combination of a spiritual and sensual principle. The most devout follower of Schönherr was Johann Wilhelm Ebel (1784-1861), a preacher and teacher at Königsberg.

Mudfishes, a group of widely differing fishes frequenting muddy waters. The term includes the bowfin or mudfish found throughout our central states from Lake Superior to Florida and Texas; a small marine goby occurring on the California coast; the killifish called the mummichog; and the lungfishes or Dipnoi. The bowfin is known in the South as mudfish or grindle; in the North it is sometimes called dogfish, sometimes lawyer. It attains a length of about two feet, a weight of twelve pounds; the head is thick, the mouth filled with powerful teeth. It is very voracious. When frightened, the young seek safety in the mother's huge mouth. The Dipnoi or double-breathers, in having lungs, approach the class of amphibia just above the fishes.

Muensterberg, Hugo, a psychologist and professor at Harvard University and a distinguished scientist and writer, was born at Danzig, Germany, in 1863. After studying in the gymnasium or classical secondary school at Dantzig, he entered the Universities of Leipzig and Heidelberg in turn, and became an instructor at Freiberg University in 1887 and adjunct-professor in 1891. In 1892 Professor Muensterberg accepted a chair of psychology in Harvard University. He belongs to the scientific rather than philosophic school of psychology; and has done much in America for the experimental method in this field. In addition to many publications in German, Professor Muensterberg is the author of two semipopular English works: *American Traits* and *Psychology and Life*.

Muhlenberg (*mū′len-bĕrg*), **William Augustus,** an American divine, noted as a hymn-writer, was born at Philadelphia, Sept. 16, 1796. He graduated at the University of Pennsylvania in 1814, and became an Episcopal clergyman. Soon after becoming rector of a New York church, he set about getting funds to found St. Luke's Hospital, and it was due to his efforts that the first American order of Episcopal deaconesses and St. Johnland Church Industrial Community were organized. He was the author of the well-known hymn, *I Would Not Live Alway*, and edited several collections of church music. He died at New York, April 8, 1877.

Muir, John, an American naturalist, geologist and explorer, was born at Dunbar, Scotland, on April 21, 1838. He was educated in Scotland until 1849, when his father came to Wisconsin and made a farm near Fox River. In 1860 Muir entered the University of Wisconsin, graduating in 1864. Then he began the many lonely journeys throughout Canada and the United States that made him a botanist and a geologist. In 1868, after exploring Yosemite Valley, he settled there, living alone in his mill and on the mountains for ten years and specially studying glacial traces in the Sierra Nevada. He contributed to *The Tribune* of New York City on the subject, and discovered 65 residual glaciers. In 1879 he visited Alaska, discovering Glacier Bay and the wonderful Muir Glacier, and explored the upper courses of Yukon and Mackenzie Rivers. In 1880 he visited the arctic regions with the American expedition in search of Lieutenant De Long. He wrote more than 150 articles on the natural history of Pacific America. He long urged the preservation of American forests and the establishment of national parks, the formation of the Sequoia and Yosemite reservations being due to his efforts. His writings compare in literary quality with those of Burroughs. Harvard has honored itself by giving him the degree of master of arts, Wisconsin that of doctor of laws. He died Dec. 24, 1914. See FOREST-RESERVES and NATIONAL PARKS.

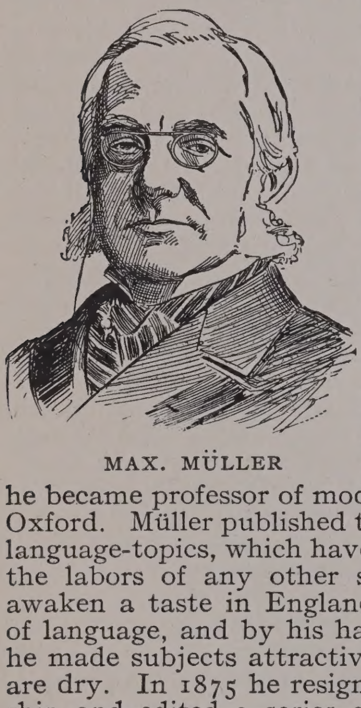
Mulat′to. See NEGRO.

Mul′berry, species of *Morus*, a genus which belongs to a family closely related to the nettle family. About 100 species of mulberry have been described, all of which are trees of the temperate regions of the northern hemisphere. In the United States the mulberry is known almost entirely as a fruit-bearing tree, although it is not cultivated in any general way. In the Old World mulberries are grown as food for silkworms as well as for the fruit. The silkworm mulberry is *M. alba*, and the chief fruit-producing mulberry is *M. nigra* *M. alba* is a native of China, and has been cultivated from the earliest times in connection with the silk-worm industry. The fruit is small and white or violet. The tree is quite frequently seen here about old farm-houses, is small, has smooth, shiny leaves. The black mulberry is a native of Asia, and is cultivated chiefly in the Old World for its fruit, which is large and fleshy, mostly dark-colored. The native red mulberry of the United States is *M. rubra*, which grows mostly in rich soils and bottom lands. It is generally distributed, common east of the Mississippi. The tree varies in height from 15 to 60 feet, the branches grow low and spread wide, giving a rounded form. The bark is rough and grayish-brown. In early summer the brilliant yellow-green foliage of that time is markedly beautiful. In size and shape the fruit reminds one of a long, wild blackberry; the color is red, turning to a deep purple. The berries are juicy, rather insipid. The wood is soft, light yellow in color, and of value; from the inner bark a fibre is obtained that the Indians of the south weave into a cloth. The paper mulberry, growing here from New York southward, has been introduced into this country from China and Japan, where it is cultivated for its fibrous bark, utilized in making paper. It is a small, low-branched tree, its leaves closely resemble the red-mulberry leaves, but the fruit is quite different, club-shaped, unlike in taste.

Mulch (*mŭlch*) is a covering of straw, leaves, tan-bark, manure etc., placed on the soil that is not easily cultivated, to prevent loss of moisture by evaporation, as in closely planted orchards. Soil-mulch is a layer of soil loosened by raking, harrowing or shallow plowing, to break up capillarity (*q. v.*).

Mülhausen (*mül′hou′zen*), a city of Alsace-Lorraine, France, on the Ill and the Rhône and on the Rhine Canal, 20 miles northwest of Basel. Its cotton manufactories employ 75,000 hands, and it has printing and dye works for cotton, linen, calico, wool and silk fabrics and chemical and iron-works. The city was founded before A. D. 717, and became a free, imperial city in 1273. It became a part of France in 1798, and after 1829 began to be a noted manufacturing center. Its arrangements for housing and caring for the working-classes are remarkably good. After the war of 1870 Mülhausen was a German possession until the World War (*q. v.*). Population 94,498.

Mullein (*mŭl'lĭn*), the name of a species of the genus *Verbascum*, which belongs to the figwort family. The genus contains about 125 species, all of them natives of the eastern hemisphere. About five species have become naturalized in North America, the most conspicuous of which is the common mullein (*V. thapsus*), an erect, stout, simple plant, which is densely woolly all over and is exceedingly common in fields and waste places. It is a native of Europe and Asia, and is said to have received in England no less than 40 common names. The next best-known naturalized species is the moth mullein (*V. blattaria*), with a slender, merely pubescent stem, and a loose cluster of yellow or white flowers with brown marks.


MAX. MÜLLER

Müller (*mü'lẽr*), **Friedrich Maximilian,** was born at Dessau, Germany, Dec. 6, 1823. His father, Wilhelm Müller, one of the greatest German lyric poets, died when Friedrich was four He took his degree at Leipsic in 1843, and devoted him self to the study of Sanskrit. In 1847 the East India Company commissioned him to edit the *Rig-Veda* at their expense. In 1854 he became professor of modern languages at Oxford. Müller published treatises on many language-topics, which have done more than the labors of any other single scholar to awaken a taste in England for the science of language, and by his happy illustrations he made subjects attractive that ordinarily are dry. In 1875 he resigned his professorship and edited a series of translations of the *Sacred Books of the East.* In 1878 he was Hibbert lecturer, in 1890–2 Gifford lecturer. His indefatigable industry was astounding. Among his books are *Chips from a German Workshop; Comparative Mythology; The Science of Thought; Physical Religion; The Science of Religion; Language, Mythology and Religion; The Science of Language;* and *The Origin and Growth of Religion;* to say nothing of his *Autobiography*, his English translation of Kant's *Critique of Pure Reason* and monographs on a dozen languages. In oriental languages, literatures and religions he was a successful popularizer, but only in Sanskrit did he outrank the specialists. He died at Oxford, England, on Oct. 28, 1900.

Müller, Johan'nes, a distinguished German physiologist, was born at Coblentz in 1801 and died at Berlin in 1858. He became professor of physiology at Bonn in 1826 and at the University of Berlin in 1833. He is a monumental figure in the history of physiology. By wide observation and experiment he founded comparative physiology. He was the trainer of some of the greatest physiologists, as Ludwig, Du Bois-Reymond, Helmholtz and others. In his work he recognized the close connection between physiology and psychology, and thereby made a beginning in physiological psychology. His work was so remarkable that he gained for himself the title of the greatest physiologist of modern times. He was myriad-minded, and later in life gave his attention to zoology, winning in that field the title of the greatest morphologist of modern times. His *Handbook of Physiology* (1833) is unsurpassed in the method of handling the subject. His anatomy of some of the lower fishes (myxinoids) is remarkable for accuracy and for his appreciation of the meaning of his discoveries.

Mul'let, a food-fish found in tropical and temperate waters. On the American coast it ranges as far north as Cape Cod. The mullet family contains mostly sea-fishes, but the representatives ascend streams, and a few forms are permanent residents of fresh water. They feed at the bottom, taking quantities of mud into their mouths and sifting out the small particles of animal and vegetable matter. The name is also given to a common sucker in inland streams in the United States. These fish grow to a length of two feet. Their lower fins are of an orange-red color, and they are often called red-horse.

Mumps, an infectious disease of the salivary glands, and especially of the parotid, below and in front of the ear. Following exposure, the disease does not appear for a week to ten days, during which time the infected person may transmit the disease to others. Old people and children under four years of age do not have the disease. If both sides of the face are affected, the patient will not catch the disease again. The swelling is painful, and sometimes prevents eating, but diminishes after four or five days. The patient should be kept in bed to avoid complications. A hot water bottle applied to the swellings will relieve pain. A doctor should be summoned; in case of high fever he may give medicine to relieve the condition.

Mum'my, an embalmed body. Embalming, so named from the balm or balsam often used, is the art of preserving the body after death, and was invented by the early

Egyptians. The art appears as old as 4000 B. C. at least, for the bodies of Cheops and others of the age of the 4th dynasty were mummied. One of the earliest embalmments of which we have a record is that of Jacob, and the body of Joseph was thus prepared and carried out of Egypt. The process is described by Herodotus and Diodorus. A scribe marked with a reed-pen a line on the left side beneath the ribs, down which line the district-ripper, a low-class officer, made a deep cut with a stone-knife; he was then pelted with stones and chased with curses. The salter next removed the entrails and lungs, except the heart and kidneys, while a companion took out the brain through the nose. The body was then ready for the salts and spices necessary for its preservation, the quality of which depended upon the sum to be paid. In the case of the wealthy, peculiar drugs were passed through the nostrils into the cavities of the skull; the body-cavity was washed with palm-wine, filled with myrrh, cassia and other substances, and the cut sewed. The mummy was kept in natron (niter) for 70 days, then washed, bandaged in rolls of linen held together by gums, and set upright in a wooden coffin against the walls of the house or tomb. This process cost a silver talent, worth in our money about $3,725. Using cedar-oil was a cheaper method and cost a mina, worth about $1,215. The poorer classes washed the corpse in myrrh, and salted it for 70 days. When thus prepared and covered with a picture of the dead and clothed as a laborer in the world to come, the mummy was placed in a costly coffin ready for burial, but often kept sometime unburied — often at home — and even brought at feasts and festivals to remind the guests of the shortness of life. All classes, even criminals, were embalmed; but various other methods were used. Some mummies are found merely dried in the sand, others salted by natron or soaked in bitumen, often with the skin partly gilded and the fingers cased in silver. So successful were some of these processes, that after 2,000 or 3,000 years the soles of the feet are still elastic and soft to the touch. The sacred animals were also mummied. Possibly between 4000 B. C. and 700 A. D., when the preservative process practically ceased, as many as 730,000,000 bodies were embalmed in Egypt, of which many millions are yet hidden. Important finds are made from time to time; as in 1881 when over 30 mummies of potentates, including Rameses II, were found together at Deirel-Bahari. Mummies were used in the 15th and 16th centuries of our era for drugs and as nostrums against diseases. Arsenic, chloride of zinc and formaldehyde are now used where bodies are to be kept only for a short time.

Münchhausen (*münk'hou-zen* or *mün-chä'sen*), **Karl Friedrich Hieronymus**, Baron von, was born on May 11, 1720, at Bodenwerder, Hannover, of an old and noble family. He served as cavalry officer in Russian campaigns against the Turks, and died at his birthplace, Feb. 22, 1797. A collection of his marvelous stories, or stories attributed to him, was first published in English under the title of *Baron Münchhausen's Narrative of His Marvelous Travels and Campaigns in Russia*, in 1785. Münchhausen's name has become proverbial for wild and impossible exploits.

Mun'cie, Ind., is a rapidly growing city in Delaware County, on White River, in eastern central Indiana, a region that produces an abundant supply of natural gas, which is largely utilized as fuel by the industries of Muncie. It is situated 54 miles northeast of Indianapolis. Five main line railroad systems run through Muncie, and there is also a network of interurbans throughout this section of Indiana, Muncie having the service of five electric lines as well. The second largest traction station in the United States is located at Muncie and its manufactures embrace pulp and paper works; a flour-bagging factory; glass, nail and iron works and a large fruit jar manufacturing works. It has a number of good schools, 33 churches, four national banks, a public library and a Masonic building. The present population is 50,000.

Mundelein, Cardinal George W., of Chicago was born in 1872. He was the youngest monsignor ever appointed in the United States. He was the youngest American bishop when he was appointed Auxiliary Bishop of Brooklyn in 1901. He was the youngest American archbishop when he was appointed Archbishop of Chicago in 1916. He was the youngest cardinal when he was raised to the Cardinalate in 1923.

Münich (*mū'nĭk*), capital of Bavaria, lies chiefly on the western bank of the Isas, 272 miles west of Vienna. Münich is one of the handsomest cities of Germany and perhaps the richest in treasures of art, while itself famous for its school of painting. Among the main buildings are the *Glyptothek*, with its fine collection of ancient and modern sculptures; the *Old Pinakothek*, containing paintings by the old masters, besides thousands of engravings and drawings and a priceless collection of antique vases; the *New Pinakothek*, filled with modern paintings; the royal and national library; and the Bavarian national museum. Among the gates the most beautiful are the Gate of Victory, the old Isar gate and the *Propylæa*.

The university of Münich has 234 professors and teachers and 5,734 students. Münich is noted for stained-glass works, iron, brass and bell foundries, lithographing and engraving works and factories of optical and mathematical instruments. There also are large breweries of Bavarian beer, which produce yearly over 50,000,000 gallons. The chief trade is in grain, and in objects of art. The true history of modern Münich is the account of its growth as an art-center in the 19th century. Population 595,053. See Mrs. Howitt-Watts' *Art-Student in Munich.*

Munic'ipal Government. A municipality is a corporation representing a certain local community and created for the purposes of local self-government. It has always been confined to communities that are thickly populated — towns or cities — where there are many interests common to the people living in the district which do not greatly concern people living elsewhere.

In America, the right of cities to home rule in all states except Michigan, apparently, depends upon the state constitution or upon the will of the legislature. There have been many instances of interference with the freedom of cities in local affairs, especially in New York, Pennsylvania, Massachusetts and Ohio. On the other hand, in the following states constitutional amendments have been adopted that provide that the city shall within wide limits determine for itself the nature of the charter that it shall have: Missouri, California, Washington, Colorado, Minnesota and Oregon.

In types of municipal government there may be distinguished two extremes: the complicated department government, of which New York is the best illustration, and the simple government by a commission or small council exemplified in Galveston and Des Moines. The former is patterned rather after the English, the latter after the German model. The majority of our cities are nearer the former than the latter, and we may therefore give a brief description of the charter of the City of New York, so far as it deals with this subject. There are a legislature — the Board of Aldermen; an executive — the mayor; and municipal courts. The first has some 90 members, elected every two years. No ordinance can be passed without its approval, and it can override the veto of the mayor by a three-fourths vote. It may decrease but not increase budgets. No franchise may be granted for more than 25 years, except in the case of tunnels, for which a franchise of 50 years may be granted. Limited renewals are permitted. Tunnels must pay 3% of their net profits to the city, after they have earned 5% for their owners. The mayor is elected for four years. He appoints the heads of the following departments: finance, law, police, water, gas and electricity, street-cleaning, bridges, parks, public charities, correction (prisons etc.), fire, docks and ferries, taxes and assessments, education, health and tenement-house departments. He appoints all the members of the board of education. The controller (treasurer) is separately elected by the people, every four years. There is a board of estimate, consisting of the mayor, the controller, the president of the board of aldermen and the presidents of the five boroughs (Manhattan, Bronx, Brooklyn, Queens and Richmond), in which each member has from one to three votes according to his importance. This board submits its estimates to the board of aldermen. A peculiar feature is the division of the city into boroughs, after the London model, each borough having a president and also departments that deal with streets, buildings, sewers and bridges. The presidents are elected. Another remarkable feature is the art-commission, consisting of the mayor, the presidents of the Metropolitan Museum of Art and the Brooklyn Institute of Arts and Science (two private institutions), the president of the N. Y. Public Library, a painter, a sculptor, an architect and three other citizens of New York, who have the power to prohibit the city coming into possession of any work of art (including bridges and buildings), which does not meet the approval of the commission. There are 46 local boards of education acting under the main board of 46 members. There are 25 municipal courts, of which those in Manhattan and Bronx are appointed by the mayor and the rest elected.

The committees that have taken charge of Galveston and Des Moines have produced results that have been eminently satisfactory thus far. But it is obvious that such government gives to the unscrupulous an opportunity to carry on for years without detection the robbery of the public. Among the best-governed cities of the country may be mentioned Cleveland, Detroit, Des Moines, Springfield, Mass., Boston and some smaller cities, especially in Massachusetts and the interior.

Among the measures advocated by the National Municipal League are the following: that municipal elections be held separately from state and national elections; that municipal officers be nominated by petition and not by primaries; that a four-fifths vote of the council together with the approval of the mayor be necessary to the granting to any private party of the ownership of streets, bridges or other public places; that franchises may not be granted for more than 21 years· that self-supporting municipal enterprises, as car-lines, gas-works etc., may be engaged in to any extent; that the council and mayor be elected by the people, without provision for a separate municipal legislature; and that cities over 25,000 inhabitants may frame their own charters. These suggestions point towards municipal ownership of public utilities, as car-lines, gas-works etc., limiting the responsibility of government to a small number of people and doing away with the cumbersome board of aldermen. In Detroit the referendum has been adopted, and in San Francisco, Los Angeles, Denver and Portland, Oregon, both the initiative and the referendum. The initiative enables a small percentage of the citizens to compel the consideration of any proposal, and the referendum enables a similar small percentage to compel the council to refer any matter to the vote of the people at large.

The business with which a municipal government is concerned is indicated by the list of departments given above in connection with New York City. In many cities the municipality has undertaken such enterprises as playgrounds and gymnasiums, libraries and reading-rooms, public baths, public laundries, public lodging-houses and cottages and public transportation.

With regard to foreign city-government we may note that the boards of aldermen and other local legislative bodies in Great Britain seem to attract a desirable class of men and to be characterized by intelligence, energy and progressiveness. In Germany perhaps the most noteworthy point is the frequent practice of electing the council for a term of years, while the mayor is often appointed for a long term of years or for life, after passing an examination and showing his qualifications for the position, as would any other professional man in applying for employment under the city's government. Much emphasis has long been placed in some European cities upon the beauty of the city. One of the reasons for this has been the desire to attract to the city the wealthy; it is said that this has been the motive of the magnificent development in the past few years of the great city of Rio Janeiro, Brazil. But a higher motive is found in the desire to represent in the city the ideals of the nation through works of art. Men are everywhere waking to the fact that the city will in a few years be the abode of nearly half the civilized world, while it will be the constant resort of the other half for amusement, for instruction and for business. Hence it is essential that in the city men shall find inspiration similar to that which nature has always afforded to the better side of man. This can only be done by a truly beautiful city.

Munkacsy, Mihaly (*mŏŏn'kä-chē*), a Hungarian painter, was born at Munkács, Hungary, Oct. 10, 1846. His real name was Michael Lieb, and his family, before the revolution of 1848, was one of modest affluence. The father having lost both property and life in the uprisings of that year, the son was apprenticed to a cabinet-maker. He was encouraged in his first artistic attempts by Samosy, an artist of some reputation; and, having reached the Vienna Academy, he was enabled to study to some purpose under Adam (Franz). He went to Düsseldorf in 1867, and there painted *The Last Day of a Condemned Man*, which at once won him fame. He removed to Paris in 1870, married in 1874, and built himself an elegant mansion. His best known works in America are *Milton dictating to His Daughters* and *Christ before Pilate.* He visited the United States in 1886, and painted several portraits of prominent people in New York. His earlier works show the somber effects of his laborious life; his middle period something of the lightness of the Parisian environment; but his greatest fame was won in the third period of his development from the treatment of historic and sacred themes. He died near Bonn, May 1, 1900.

Murat (*mü'rä'*), **Joachim,** king of Naples, was the son of an innkeeper near Cahors in France, and was born on March 25, 1771. He was at first intended for the priesthood, but the outbreak of the revolution sent him to the army, where he soon rose to the rank of colonel. Attaching himself closely to Napoleon, he served under him in Italy and in Egypt, achieving distinction in many battles. He was made a general of division in 1799, and greatly helped Napoleon on the critical 18th Brumaire by dispersing the council of five hundred at St. Cloud. Napoleon now intrusted him with the command of the consular guard, and gave him his youngest sister, Caroline, in marriage. Murat held his usual post, the command of the cavalry, at Marengo, where he covered himself with glory, and in 1801 was named governor of the Cisalpine Republic. When Napoleon became emperor, he continued to command his cavalry, and helped greatly to win the victories of Austerlitz, Jena, Eylau and other battles. In 1806 the newly made duchy of Berg was given him, and on Aug. 1, 1808, he was proclaimed king of the two Sicilies, under the name of Joachim I Napoleon. He took possession of Naples, but failed to secure control of Sicily. He governed well and won the hearts of his subjects. In the Russian campaign he commanded the cavalry; and the army after Napoleon left it. After crushing the Austrians at Dresden in 1813 and helping to fight the battle of Leipsic, he made a treaty with Austria and a truce with the British admiral; but as soon as he heard of Napoleon's return from Elba, he began a hasty war against Austria. He was twice defeated at Ferrara and Tolentino, and with a few horsemen made his way to Naples. Here he found the country in a state of insurrection, and at once proceeded to France. After the overthrow of his chief, he took refuge in Corsica. From here he went with a few followers to the coast of Calabria and proclaimed himself king, but was soon taken prisoner, tried by court-martial and shot at Pizzo, Italy, Oct. 13, 1815. Of his two sons, Achille Napoleon, the older, went to America, married a niece of Washington, and settled in Florida; Lucien Charles Napoleon, the younger, became a French senator and ambassador under Napoleon III. See Macirone's *Fall and Death of Murat.*

Murchison (*mûr'kĭ-sun*), Sir **Roderick Impey,** Scottish geologist and geographer, was born at Tarradale, Ross, Feb. 19, 1792. He studied at the Military College, Great Marlow, and entered the army at an early age. He served as an officer in Spain and Portugal, but left the army in 1816. He then studied and traveled in various parts of the globe. He found the same rock-strata underlying the red sandstone of mountainous regions of Norway and Sweden, in the distant provinces of the Russian empire and in America. This gave him the clew to the discovery of the silurian system and a wide reputation as a geologist. He explored several parts of Germany, Poland and the Carpathians; and in 1840–45 carried out a geological survey of the Russian Empire. Struck with the similarity between the rocks of the Ural Mountains and the Australian chain, Murchison in 1844 first foretold the discovery of gold in Australia. Perhaps no man of his time did more to encourage geographical science and kindle the spirit of adventure among those engaged both in arctic exploration and in African discovery. He was a member of many scientific societies, was knighted in 1846, became a baronet in 1863, and in 1855 was made director of the Royal School of Mines. His chief works are *The Silurian System* and *The Geology of Russia in Europe and the Ural Mountains.* Murchison died on Oct. 22, 1871. See his *Life* by Professor Archibald Geikie.

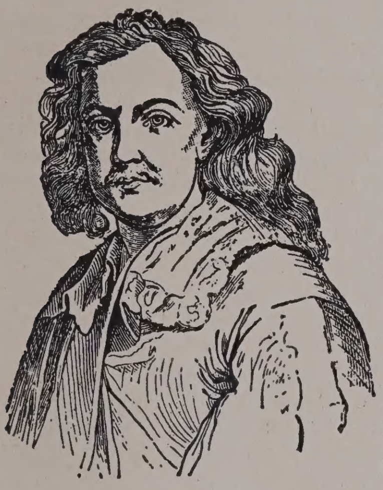
Murcia (*mûr'shĭ-ȧ*), an old city of Spain, on Segura River. It is an old-fashioned, Moorish place, surrounded by gardens of mulberry, orange, fig, palm and other fruit-trees. The main buildings are the bishop's palace and the cathedral, begun in 1353. Silks, saltpeter, gunpowder, soda, musical instruments and glass are manufactured. Fruit-growing, the preparation of olive-oil and esparto-weaving also flourish. Alfonso X took the city from the Moors in 1263. An earthquake almost destroyed it in 1829, and it was captured by Spanish rebels in 1843. Population 133,045.

Mur'doch, James Edward, an American actor, was born at Philadelphia, June 25, 1811. He first appeared on the stage in his native city. In 1838 he supported Ellen Tree in leading characters at New York. He left the stage in 1842 to teach elocution. He also lectured on Shakespeare. In 1845 he again became an actor, appearing at New York as Hamlet and afterward toured in Canada, California and England. During the Civil War he gave readings throughout the North in aid of the sanitary commission, devoted himself to the care of sick and wounded soldiers, and served for a while on General Rousseau's staff. Together with William Russell he published *Orthophony or Culture of the Voice.* After the war Mr. Murdoch lived at Philadelphia, and died at Cincinnati, May 19, 1893.

Murdock, William, the inventor of gas used as a light, was born on Aug. 21, 1754, near Auchinleck, Ayrshire, Scotland. He worked under his father, who was a millwright and miller, till he was twenty-three. He then entered the employment of a Birmingham house and showed such marked ability that he was sent to Cornwall to superintend the setting up of mining engines there. In 1784 he built the model of a high-pressure engine to run on wheels. His work at Cornwall was hard, yet up to his forty-fourth year his wages were not more than $5 a week. Murdock's inventive brain was never idle; he introduced labor-saving machinery of various kinds and an oscillating engine of a pattern still in use. His investigations in the distillation of coal-gas began in 1792, when he lighted his offices and cottages by this means. But he reaped little profit from this useful invention. Murdock died at Birmingham, England, Nov. 15, 1839.

Mur'free, Mary Noailles, whose fame as a writer was gained under the name of Charles Egbert Craddock, was born in 1850 near Murfreesborough, Tenn. Her first story, which appeared in the *Atlantic Monthly*, was *The Dancin' Party.* Egbert Craddock was the name of the hero of her second short story, which was half-written when she was about to mail the first part to the publishers. Being at a loss for a pseudonym, she stole that of her hero, with the prefix Charles. The buildings at Miss Murfree's birthplace, the scenes of parts of *Where the Battle was Fought*, were riddled by shot and shell at the battle of Stone River. This is a novel of great and picturesque power, though *The Prophet of the Great Smoky Mountains* is held to be her best work. *In the Tennessee Mountains* is a collection of eight stories *Down the Ravine* professes to be a young people's story, but no one is too old to be entranced by its sketches of scenery in the Cumberland Mountains and the picture of the "powerful peart" little sister, Tennessee. Miss Murfree puts her heart into her work. Her later books include *The Juggler; The Phantoms of the Footbridge; The Mystery of Witch-face Mountain; The Bushwackers; A Spectre of Power;* and *The Frontiersman.*

Mur'freesbor'ough, from 1819 to 1826 the capital of Tennessee, is 33 miles southeast of Nashville, and has several mills and factories, chief among them being cotton-gins, cotton compresses, machine-shops, tanneries, flour and lumber mills, red cedar ware and carriage-factories. Close by the bloody battle of Stone River was fought, Dec. 31, 1862, and Jan. 2, 1863, between Generals Rosecrans and Bragg. The Confederate army was forced to retreat. The losses on both sides, in killed and wounded, were nearly equal — Federals, 9,511; Confederates, 9,236. On this site is a national cemetery, which contains the graves of 2,333 unknown dead. Population 4,679.



MURILLO

Murillo (*mū-rĭl'lō*), **Bartolomé Esteban,** a famous Spanish painter, was born of poor parents at Seville, Spain, and baptized, Jan. 1, 1618. He had a little schooling, and was then placed with a relative who was an artist, to study painting. He went to Madrid at the age of 24, where he was kindly noticed by Velasquez, his celebrated townsman, and through his influence was enabled to study the great Italian and Flemish masters in the royal collections of paintings. He went back to Seville, where he settled in 1645. Here he painted 11 large and remarkable pictures for the convent of San Francisco. At once he won fame and more orders than he could well fill; and was acknowledged as the head of the school there. In 1648 Murillo married a woman of fortune, and his house became a center of taste and fashion. About this time he passed from his first or "cold" style — dark with decided outlines — to his second or "warm" style, in which the drawing is softer and the color better. Of the second style good examples are *St. Leander*, the *Nativity of the Virgin* and *St. Anthony of Padua*. In 1656 he was at work on four large pictures in the form of a half-circle, which are the first examples of his third or "vaporous" style, the outlines vanishing in a misty blending of light and shade. In 1660 he founded the Academy of Seville; and was its president for a year. After this appeared Murillo's most brilliant paintings. Of the 11 pictures painted between 1661 and 1674 for the almshouse of San Jorge, eight are held to be his masterpieces. Among them are *Moses striking the Rock*, *Abraham and the Angels*, *The Miracle of the Loaves and Fishes*, *St. Peter released from Prison* and *St. Elizabeth*. His famous picture, *The Conception*, now in the Louvre at Paris, was sold in 1852 for $120,000. In 1681 he went to Cadiz, and while there fell from a scaffold when painting an altarpiece in the church of the Capuchins. He went back to Seville and died from his injuries, April 3, 1682. Murillo's pictures are in two groups: scenes from low life, gypsies and beggar-children (mostly painted in early life) and Scripture and religious works. His pictures show great technical skill and truth to nature and sentiment, while as a painter of the texture of human flesh he has never been equaled. See Miss E. E. Minor's *Murillo* and C. B. Curtis' *Velasquez and Murillo*.

Mur'ray, Hon. George H., was born at Grand Narrows, Nova Scotia in 1861. He was educated at Boston University, and called to the bar in 1883. He was appointed to the Legislative Council 1889, and a member of the Fielding Administration in 1891. When Mr. Fielding resigned to go to the House of Commons, Mr. Murray was called on to form an administration. He was re-elected at each general election since and now is Premier of Nova Scotia.

Murray, Lind'ley, an American grammarian, was born at Swatara, Lancaster County, Pa., April 27, 1745. He was educated at Philadelphia at a school conducted by the Friends. His father having removed to New York, he was placed in a counting-room there; but he ran away to pursue his studies at school in another state. He was later admitted to the bar, but during the Revolution was engaged in business in New York, where he rapidly acquired a fortune. In 1784 he retired from mercantile life, going to England where he purchased an estate and devoted himself to literary pursuits. His *English Grammar*, issued in 1795, was received with enthusiasm, and his *English Reader* was used upon both sides of the Atlantic. These books retained their unbounded popularity in schools for 50 years or more. He died at Holdgate, England, Feb. 16, 1826.

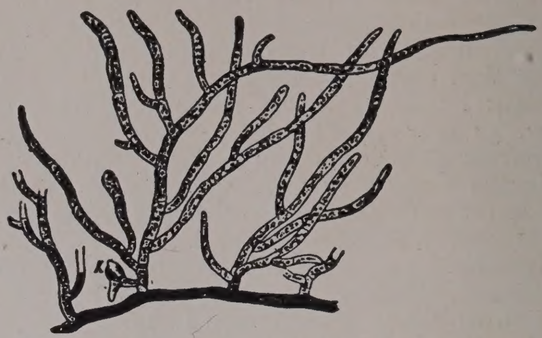
Murray Canal. This canal is without locks. It extends through Murray Isthmus, giving connection westward between the headwaters of the Bay of Quinté and Lake Ontario and thus enabling vessels to avoid the open-lake navigation. It is five and one sixth miles long, and its depth is eleven feet below the lowest known lake level. The breadth at the bottom is 80 feet and at water-surface 120 feet. See WELLAND CANAL

Murray, the chief river of Australia. It rises in the Australian Alps, flows northwest along the frontiers of New South Wales and Victoria, and in South Australia passes southward through shallow Lake Alexandrina toward the sea at Encounter Bay, a distance of 1,120 miles. It is navigable for small steamers to Albury,—190 miles northeast of Melbourne, but its mouth cannot be entered by ships of any size. Its main branches, the Lachlan, Murrumbidgee and Darling, are themselves large rivers.

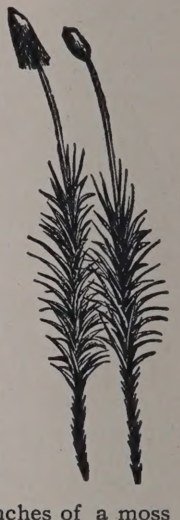
Muscat (*mŭs-kăt′*), capital of the independent state of Oman or Muscat in southeastern Arabia, stands in a narrow rocky cove that opens out into the Indian Ocean on one side and on the other is the outlet of a pass into the interior. It is surrounded by a wall and defended by forts on the rocky heights above. It has narrow, uncleanly streets, and is very hot in summer. Its position makes it of great importance for the trade between eastern Arabia, Persia, India, the eastern coast of Africa and the Red Sea. Its chief exports are pearls and fish, in which the waters of the coast are very rich, together with salt, dates, drugs, dyestuff and horses. Although a very old place, Muscat was small and unimportant until the Portuguese took possession in 1508. Under their rule, lasting 150 years, it became a flourishing trading-town. It was afterward ruled by native princes called *imams*. The Muscat *imams* also ruled Zanzibar and other places in Africa, but lost these territories in 1856. Population 25,000.

Muscatine (*mŭs′kȧ-tēn′*), **Ia.,** county-seat of Muscatine County, is situated on the western bank of the Mississippi, where the river makes a great bend to the south. It has a large trade by river and rail, an excellent harbor with municipal warehouse and a traveling crane for handling freight quickly and cheaply; has more than forty pearl button factories employing over 2,000 people; also furniture factories, sash and door mills, lumber mills, and produces large quantities of canned goods, threshing machinery, air calliopes, button-making machinery, pulleys, cement vaults, steel culverts and leather goods. Population, 16,178.

Musci (*mŭs′sī*), one of the two great groups of *Bryophytes*, commonly known as mosses. The numerous species are adapted to all conditions, from submerged to very dry, and are most abundantly displayed in temperate and arctic regions. They have great powers of vegetative multiplication. In consequence of this they form the well-known thick carpets and mosses, and the bog-mosses often completely fill up bogs or small ponds and lakes with a dense growth which dies below and continues to grow above. These bogs are sometimes called quaking bogs or "mosses," and furnish very treacherous footing. When the ordinary spore of a moss germinates, it at first produces a little, green, branching, filamentous body resembling an alga and called the protonema. Upon this prostrate protonema arise buds, which develop into the erect, leafy branches that represent the ordinary moss-plant. These leafy branches usually bear the sex-organs (antheridia and archegonia) at their summits. In the archegonium the egg is fertilized, forming the oöspore. When the oöspore germinates, it forms a body which grows downward into the leafy branch for anchorage and also grows upward in the form of a stalk bearing a spore case. This anchored leafless body is the sporophyte, and is very commonly called the moss-fruit, although in no sense a fruit. The protonema and the leafy branches bearing sex-organs constitute the gametophyte (See ALTERNATION OF GENERATIONS). This peculiar leafless sporophyte of the moss is usually distinguished from the leafy sporophyte of ferns and seed-plants by being called a sporogonium. The most complex structure of mosses is the spore case or capsule. Usually perching upon the top of a young capsule is a loose conical cap or hood, known as the calyptra. This calyptra is the enlarged and ruptured archegonium, which has been carried up by the development of the capsule. Removing the calyptra a small lid ("operculum") is discovered, which, upon being removed, reveals the rim of the urn-like capsule. This rim is frequently beset by numerous beautiful hair-like or tooth-like processes, which extend toward the center and form what is called the peristome. These peristome teeth are of service in discharging the spores Running through the midst of the capsule

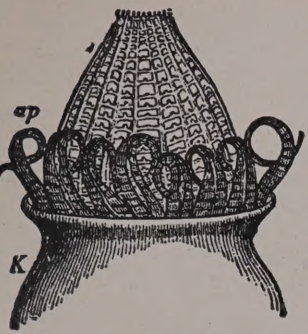


Protonema of a moss, showing a bud (*k*) which is to give rise to the leafy branch.



Leafy branches of a moss bearing the stalked capsules (Sporophytes), the one to the left still retaining the hoodlike calyptra.

is a central axis of sterile tissue known as the columella. Mosses are divided into two great groups: (1) sphagnum mosses, which are large and pallid bog-mosses, found abundantly in marshy grounds, especially in temperate and arctic regions, and are conspicuous peat-formers; (2) true mosses, which contain the great majority of the mosses and are the representative *Bryophytes*, growing in all conditions of moisture from actual submergence in water to dry rocks See Mosses. John M. Coulter.



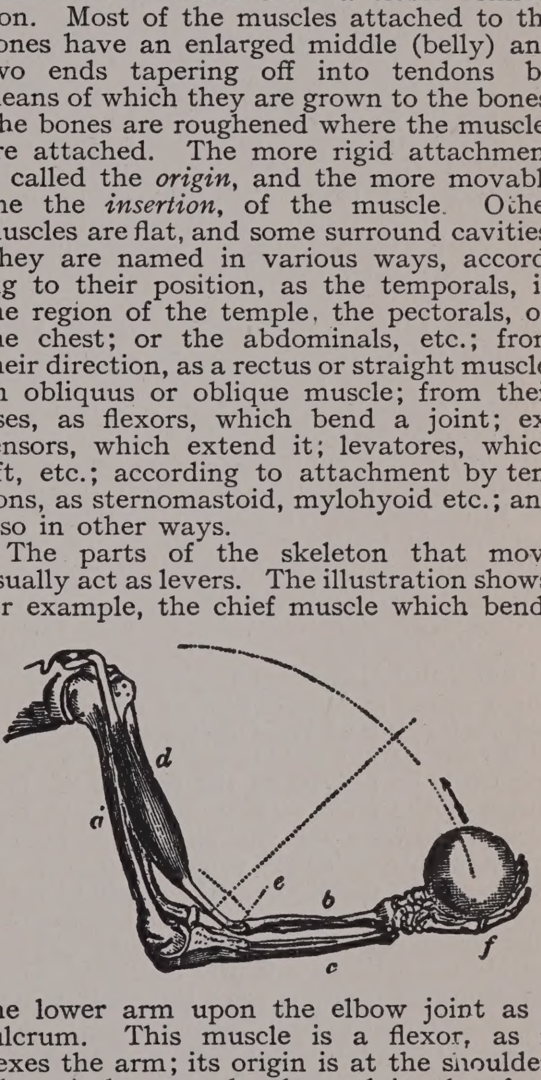
(*k*) Top of moss capsule, (*ap*) showing the peristome teeth.

Muscle (*mŭs''l*), an animal tissue endowed with the power of contraction. It is the part called flesh or lean meat in the higher animals. Through its action motion and locomotion are accomplished in the animal kingdom. Muscles have not been developed in the simple, microscopic animals, like the amœba and its relatives, and, therefore, their movements are not dependent upon muscles, but upon the powers of the protoplasm of which they are composed. In that, however, lies the germ from which muscular tissue is developed. Muscles are composed of modified protoplasm, in which the power of contraction has been highly exalted, while the other qualities of protoplasm are undeveloped or held in check. Muscles first make their appearance in animals of the grade of hydra and the jellyfishes, but in them they are imperfectly developed In all animals of a higher grade than jellyfish muscular tissue is fully developed. It arises in the middle germ layer (*mesoblast*). In its formation the cells elongate into fibers.

As an example of muscular tissue take the muscles of the arm. These are bundles of flesh, which can be felt under the skin running lengthwise in the arm. Each muscle is covered with a smooth, shining membrane, and is made up of a number of bundles also covered with a thin membrane. These bundles are further subdivided into smaller ones, and the microscope shows that these are made of thread-like fibers lying side by side. All are surrounded by sheaths and united together. The microscopic fibers are crossed by stripes, and this kind is called *striated* muscular tissue. It is the kind usually controlled by the will, and is therefore called voluntary. There is another variety of muscular tissue found in the walls of the alimentary canal and blood-vessels (and in other situations), the action of which is not directed by the will, and, therefore, is called involuntary. Under the microscope this is made up of spindle-shaped cells, each with a round nucleus in the middle. These are not striped, and this kind is called *smooth* muscular tissue. The muscles of the heart are striated, but are branched and different from ordinary muscles. Therefore we have the three varieties: striated, smooth and heart-muscle.

There are about 400 muscles in the human body, most of them in pairs. All receive distinct names, and are connected with nerves and blood-vessels. The blood-vessels for their nourishment form a network around the fibers, while the nerves which control them form a closer connection. Most of the muscles attached to the bones have an enlarged middle (belly) and two ends tapering off into tendons by means of which they are grown to the bones. The bones are roughened where the muscles are attached. The more rigid attachment is called the *origin*, and the more movable one the *insertion*, of the muscle. Other muscles are flat, and some surround cavities They are named in various ways, according to their position, as the temporals, in the region of the temple, the pectorals, on the chest; or the abdominals, etc.; from their direction, as a rectus or straight muscle, an obliquus or oblique muscle; from their uses, as flexors, which bend a joint; extensors, which extend it; levatores, which lift, etc.; according to attachment by tendons, as sternomastoid, mylohyoid etc.; and also in other ways.

The parts of the skeleton that move usually act as levers. The illustration shows, for example, the chief muscle which bends the lower arm upon the elbow joint as a fulcrum. This muscle is a flexor, as it flexes the arm; its origin is at the shoulder, where it has two heads, and is, therefore, called the biceps; its insertion is on one of the bones of the forearm. The muscle which extends the arm is not shown in the illustration. It should be kept in mind that the action of a muscle is to contract, not to expand. In contracting it gets thicker and shorter, and it returns to its original state of extension. Other muscles perform the contrary action. Ordinarily. muscles contract in direct response to



nerve stimuli, but many causes influence them, as their condition of nutrition, mental states etc. A good illustration is found in the muscles of the face. They vary with the emotions and mental states, and the expression of the face is the result of the action of a number of muscles.

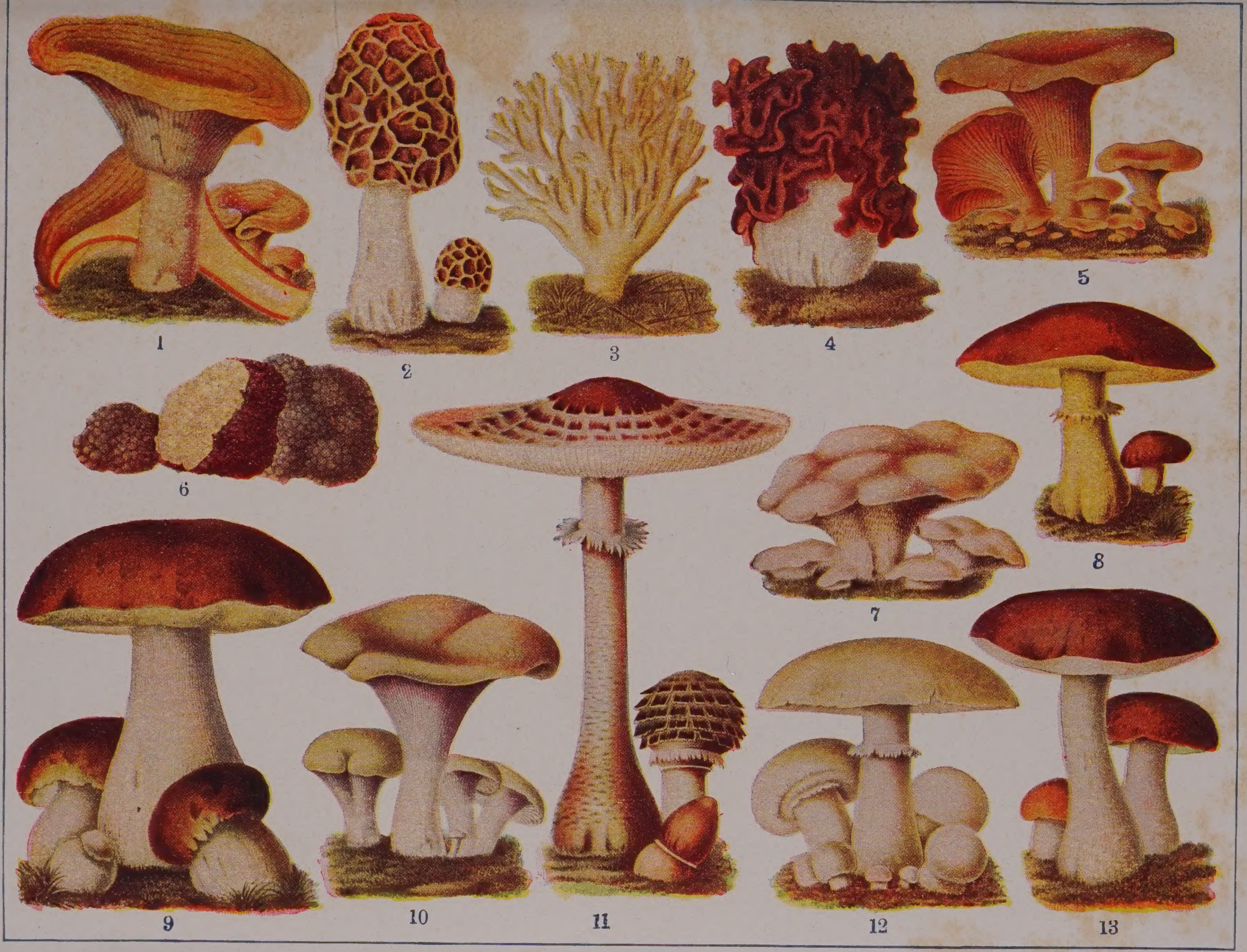
Musko'gee, Okla., county-seat of Muskogee County, on the Arkansas River. It has rich agricultural surroundings, as well as natural gas, oil and coal in the vicinity. Among its important industries are an oil-refinery, a packing-plant, sash and door factories, bottling-works, foundries, cottonseed oil and flour mills and casket, soap and broom factories. Muskogee has fine public schools, three colleges, a business college, many churches and a large convention-hall. The city has the service of four railroads, the general offices and shops of two being located here. Population 35,000.

Mu'ses, in Greek mythology, goddesses included in the first place among the nymphs but afterward held to be quite distinct from them. They had the power of inspiring song, and so poets and musicians were considered their pupils and favorites. They were first honored by the Thracians, and, as this people first lived in Pieria around Mt. Olympus, the muses were called Pierides. There at first were three, though Homer sometimes speaks of a single muse and once refers to nine. This is the number given by Hesiod, who also gives their names; Clio, the muse of history; Euterpe, of lyric poetry; Thalia, of comedy; Melpomene, of tragedy; Terpsichore, of choral dance and song; Erato, of the poetry of passion; Polyhymnia, of hymns; Urania, of astronomy; and Calliope, of epic poetry. They usually were said to be the daughters of Zeus and Mnemosyne. Homer speaks of them as the goddesses of song and as dwelling on the top of Mt. Olympus. They were also called the companions of Apollo, singing while he played on the lyre at the banquets of the gods. They were said to have won victories over the sirens in musical tournaments. Their worship among the Romans was merely copied from the Greeks, and never became truly national or popular. The fountains of Aganippe and Hippocrene on Mount Helicon and the Castalian spring on Mount Parnassus were the most famous places sacred to the nine muses.

Muse'ums on the whole are a modern birth, although the name was in existence among the ancient Greeks. For, with the Greeks, a museum either was a place dedicated to the muses; or else was of the nature of a temple, school or university. The museum of Alexandria was in its day the great university of the world. The modern museum has arisen out of the modern scientific spirit, which demands actual objects instead of mere words for purposes of study and progress. The British Museum, then, which came into being in 1753, was the beginning of a great laboratory movement in general science. The first French museum was virtually established when in 1789 the magnificent collections of the Louvre were thrown open to the public. The first great American museum was Smithsonian Institution, founded in 1846. This institute partook of the nature of a national museum, for in it were deposited the various collections of documents and relics belong to the nations, until 1876 a separate national museum was opened. The British Museum still is the center of interest to scientists, chiefly owing to its wonderful collections of antiquities and its magnificent library. For the purposes of public exhibition it is generally regarded as preferable to show but a portion of the articles, such as are of a character to attract popular interest and educate the popular mind.

Mush'rooms, edible fungi. They grow in fields and pastures, occasionally in open, grassy woods, abound in the early autumn, may be found throughout the summer. They are cultivated for the market both outdoors and in caves, cellars and other dark, cool places. Their food-value is not high, but they are prized as a table delicacy. Poisonous toadstools are frequently mistaken for mushrooms, and great care must be used when gathering the fungi. In the *Agricultural Year Book*, Washington, 1897, Farlow says: "Avoid fungi when in the button or unexpanded stage, also those in which the flesh has begun to decay, even if only slightly. Avoid all fungi which have stalks with a swollen base surrounded by a sac-like or scaly envelope, especially if the gills are white. Avoid all fungi having a milky juice, unless the milk is reddish. Avoid fungi in which the cap or pileus is thin in proportion to the gills, and in which the gills are nearly all of equal length, especially if the pileus is bright-colored. Avoid all tube-bearing fungi in which the flesh changes color when cut or broken or where the mouths of the tube are reddish; and in case of other tube-bearing fungi experiment with caution. Fungi which have a sort of spider-web or flocculent ring around the upper part of the stalk should in general be avoided." See FUNGI and BASIDIOMYCETES. Consult Farlow as above and Falconer: *How to Grow Mushrooms.*

Mu'sic, Religious. One thing is characteristic of all genuine religious music and is manifest in all its multitudinous presentations whether in the cathedral or on the street. This is that music serves as a means for expressing religious feeling. Religious music thus is not an end in itself, but is used as a means for arousing religious feeling. While music, from the martial song to the lullaby, awakens feelings of the utmost variety, the music itself does not define these feelings; it is only through the aid of



EDIBLE FUNGI

1—Tasty Fungus. 2—Morchelle. 3—Yellow Cockscomb. 4—Early Toadstool. 5—Cantarelle. 6—Truffles. 7—Stubble Fungus. 8—Butterfly Fungus. 9—Stone-Mushroom. 10—Masseron. 11—Parasol Mushroom· 12—Champignon, or Cultivated Mushroom. 13—Hooded Toadstool.

the accompanying words that we know the definite meaning.

Growing out of the fact that music is employed to heighten religious feeling, and also from the fact that music can awaken feeling and yet leave a wide range of choice as to the specific definition of the feeling, comes the fundamental necessity for making strong associations between the music used in religious services and all thoughts, sounds and sights accompanying it. This is important in order that the heightening and intensifying of feeling through these associations may be directed into religious channels. Aside from the fact that loud, vigorous and quick music excites us and that soft, gentle and slow music soothes us, we acquire in childhood associations with certain kinds of music that make these forms seem appropriate to the feelings they express, independently of any words that may be used with them. If the music employed in a religious service, besides awakening and stimulating feeling through beautiful sound-combinations, awakens at the same time echoes of previous deep religious feeling, the effect of the whole will be greatly heightened. The transfer of the musical feeling into religious emotion will thus be most effectively accomplished. On the other hand, if the music stimulates intense feeling but at the same time awakens associations with emotions quite at variance with those of the religious type, the transfer of the musical to the religious feeling will not take place.

While, in defining what the religious type of music is, no standard can be set up applicable to all, yet everyone can settle for himself a standard of judgment by the following test: Religious music should sound inappropriate on the street and the music of the street should sound inappropriate in a church, entirely apart from their pleasing or nonpleasing qualities. If a religious song expressive of love for the Savior can be sung in a concert-hall with no further change than that of writing the personal pronoun with a small letter instead of a capital, it is evident that such a song is not good church-music, either words or poetry; yet musically it may be beautiful. On the other hand, if a religious song heard even in the roar of a busy street awakens associations connected with worship, it evidently is good religious music.

We have seen the great importance of association to religious music. In order to secure the right association we must consider the second important condition, *i. e.*, the limitation of religious music, so that the style employed shall not awaken secular associations. While genuine religious music thus sacrifices much of the sensuous effectiveness of secular music, this sacrifice is compensated for by the intensity of the religious feeling awakened.

Out of this condition arises the practical problem: Shall music be made attractive by the means employed by secular music; or shall the effectiveness of its religious use be brought about simply through the cumulative influences of past religious associations? Here a conflict arises between sensuous gratification and religious expression.

The history of religious worship is full of the conflict between these two opposing influences. At the Council of Trent the church authorities threatened to banish music from the church-service, because it was employing secular means. The same conflict is going on now. The recent edict of Pope Pius, commanding that the church-service shall employ only Gregorian tones or those forms of religious music dating back to Gregory 1st, limited and archaic in their expression but for this reason having no secular connections is an attempt to use more effectively the associational power of music. At the same time it sacrifices its power of sensuous expression. In the Protestant churches the same conflict is going on. The choir-leader, the organist, the soloist are too often engaged only for the effectiveness of their work from a purely musical point of view, and the music employed is chosen for the emotion it stimulates, not for the quality of that emotion. Thus the influence upon composer, publisher, conductor, singer is to broaden the scope of religious music through the employment of all the means for stirring emotional feeling, that are known to secular art. Thus, while we have fine music which often thrills us, the transfer of this feeling into religious expression does not take place. Such music may attract to the service and serve as a sugar-coating to make a sermon endurable, but it is very doubtful whether such a use compensates for the sacrifice of the legitimate end that music should serve in worship. It introduces a subtle element of insincerity, which, for the very reason that its influence is to most of us unconscious, is all the more dangerous.

This disregard of the associational element is even more evident in the music of the Sunday-school, where, in order to make the service attractive to the children, the melodies of such songs as *Robin Adair* and *Drink to Me Only with Thine Eyes* have been employed. Though they are used in connection with religious words and the child may have no other association, he is being educated in a disregard of the difference between religious and secular music, and thus there is destroyed the possibility of using the powerful influence of the particular association of religious music. The incongruity becomes greater when, later in life, he hears the same songs sung to their secular words. Thus the most potent factor in determining the nature of religious music, *i. e.*, the congregation, is educated from childhood to disregard those distinctions that give to religious music its peculiar effectiveness. Rather than sacrifice this, it would be better to adhere consistently to the demands of pure, religious music and so to educate our congregations that they will see the incongruity of demanding from religious music what they get from secular music. If hotels, railroad-stations and factories all employed church-architecture, the significance of a given style for religious service would be lost. Similarly, if all forms of music are employed in Sunday-schools, the distinctively religious music will be lost. It will then be known only by the words that accompany it.

To sum up the points we have so far made: First, the aim of religious music is to strengthen religious feeling — we have seen how music accomplishes this through its power of awakening undefined feeling; second, association is necessary in order to make effective the transfer of musical feeling into religious feeling; third, for the sake of the necessary associations, the field of religious music should be limited; fourth, the natural desire for attractiveness in church-music tends to weaken its associational power, through the introduction of means employed by secular music. In conclusion, effective religious music, as a result of the above considerations, will belong to a type (1) long used for religious purposes; (2) employing a musical form which does not lend itself to secular use; and (3) effective musically. A mass of Palestrina, a choral by Bach or a simple hymn like Mason's Olmutz all have these three characteristics: They are thoroughly charged with religious feeling and association; they have no connection with secular forms of expression as now employed; and at the same time they are musically expressive. Religious music, to be appropriate to the use for which it is intended, does not have to be in one gloomy mood. The whole gamut of feeling from glorious *Halleluiah* to profoundest *Miserere* must be capable of being expressed through its means. But in all these changes of mood there must be felt a type or a characteristic differentiating it from the secular forms. Music expressing spiritual victory must be different from that which expresses a foot-ball triumph. The employment of the church-modes would give the modern composer an excellent opportunity for attaining effective expression of feeling and, at the same time, ensuring a distinctness of type, and there are numbers from great art-works like oratorios and masses that successfully combine attractiveness with genuineness of religious expression. Whatever can be done to make religious music attractive to modern ears without destroying its distinctive nature makes it all the more effective; but wherever effort towards attractiveness simply turns religious music into secular music, the pleasurable gain is at the cost of that very quality for which the distinction "religious music" is made. CHARLES FARNSWORTH.

Music, Teaching of. The civil engineer, the mechanical engineer, the electrician, the chemist, the astronomer, the financier and the ordinary man all employ various forms of applied mathematics, yet all begin with elementary courses which have two ends in view,— to supply the knowledge of the fundamental laws of mathematics necessary for everyone and the application of these to the needs of the general public in the problems of daily life. So in music there is need of such a cultivation as will form a basis for all musical activity and will make clear the special application of musical principles that are essential to the enjoyment of the general public. It is the aim of this article to show what the character of such a study should be and what the means for its accomplishment.

The large majority of children are able to sing more or less when they commence music-study. Hence no time need be taken from pure music-study in getting the command of an instrument. The problem is how to conduct this study, so that it will be fundamental to all forms of applied music and at the same time be useful to the general public. Whatever one may do with his music, the power to appreciate it is fundamental to all, both the performer and the listener. Hence an elementary course in music must be primarily directed toward its comprehension.

Turning to the means, there are three essentials to such comprehension: First, experience; second, a generalization from experience to the formation of ideas; and, third, the classification of these ideas so that they can be effectively used. Hence, in the elementary course of music-study, the first phase of the work will consist in giving experience through imitative singing, in forming ideas from this experience and in defining and classifying these by associating them with their notation. The second phase, by means of sight-singing, will continue the classification of musical ideas and their application in the forming of concrete musical ideas. The third phase, largely by means of instrumental examples, will continue the application by showing how definite concrete ideas are employed in large musical compositions, thus leading to a comprehension of the nature of these compositions.

Taking up the first of these phases, the first step in music-study should consist in the ability to imitate accurately what one hears and to hold such a passage in the memory. The resulting development of the power of observation and memory is especially important in music, because a musical passage is incomprehensible unless the memory relates the note or chord we are hearing with what we have heard, thus giving unity to the whole.

In connection with this first step of enriching the musical experience, the second step may be commenced — that of forming ideas. These ideas may be classified under two main heads: Those that deal with the interpretation of music and those that deal with its structure. Under the first of these the pupil will be taught to see how the effectiveness of his song depends upon the quality of his voice, the manner of pronunciation, the force or gentleness with which he sings and the expressive intention with which he does his work; all of these in relation to the text. His singing is thus a restatement and amplification of the text; and after singing a number of songs in this way the pupil will unconsciously be forming ideas of interpretation which he will not only apply himself, but expect in the work of others.

Following and paralleling this work of interpretation, ideas of structure will be taken up. The pupil will observe that the melody of his songs seems to move up and down, and gradually from the most general observation he will be led to notice specifically just what is the nature of these pitch-changes. Second, he will notice that the tones in his songs are sometimes prolonged and sometimes rapid, and from such general observation he will gradually discover the simple ratio of the changes to each other. Third, he will notice that the songs he sings group into regular pulsations and that the duration of his tones bears a relation to these pulsations; and from a notion of general pulsation he will discover that there are a few definite groupings that constantly occur in his songs. Thus the pupil will commence to observe the three classes of general musical ideas, more fully described in MUSICAL NOTATION.

The great difficulty in the formation of such general musical ideas is that the pupil is unable to keep in mind the relation of the specific observation, as pitch, duration or pulsation, to the piece of music in which he is experiencing it. Unless he does this, no general ideas applicable to musical experience can be formed. It is a matter of apperception that is here involved, and this perhaps is the point where the greatest error in music instruction is found. See APPERCEPTION.

In order to aid in keeping this connection clear, it is suggested that the first step of observation be reinforced by the second step, consisting of doing what he observes. If the child moves his hand up and down in connection with the song he is singing, showing by the change in movement the extent of change in pitch, he is greatly aided in making the mental observation clear and distinct, and at the same time it takes place while the song is being sung. So, if he claps in connection with the tones of this song, the movement of his hands will make the conception of the changes in duration more vivid and, at the same time, not interfere with the conception of the song as a whole. So, if he keeps time with his foot to the pulses of his music, he is by that means making the nature of those pulses clearer to his comprehension and, at the same time, observing their effect in the particular song he is singing. Thus ideas which have commenced to be dimly formed in the observation-step are more definitely comprehended when they are accompanied with action. This is a principle of education applied in many other studies as well as in music.

But action has the same drawback as music. In order to compare parts of an action, as well as parts of a piece of music, we have to depend on the memory for presenting the facts. In order to be able to make our ideas clearer and to classify them through the ability to compare, the second stage of acting should be followed by a third stage of picturing. If the child goes to the board and places dashes up and down to show his conception of how the melody changes in pitch, he will have before him a graphic representation of his entire tune that will enable him to compare and classify its parts. So, if he draws long and short dashes, he will be able to accomplish the same with reference to the ideas of duration, and by drawing circles on the blackboard — larger ones to represent strong pulses and, smaller ones for weak — he can have a visual expression of the pulse-grouping of his tunes. After the pupil has developed considerable skill in expressing his tonal conception by a diagrammatic representation, he will be able to take the fourth step, which consists in substituting for the diagram the regular notation of the same ideas. Such a process, carried out, will enable the pupil accurately to conceive of the general ideas that the notation suggests and through this power to form the concrete idea that their united expression represents.

We are now ready for the second phase of music-study, which reverses the process we have just been sketching out. Instead of commencing with the song and leading to its notation, we start with the notation and end with the song. In the first we went from sound to sight, in the second we go from sight to sound. This is preeminently the sight-singing process, and consists in forming ideas from their visual representation and testing the accuracy of these ideas by their vocal production. The essential thing for this process is that the child should conceive the general ideas rapidly enough, from the notation that suggests them, to combine them into the scientific idea which will enable him to produce the required tones. To accomplish this, there should be placed upon the board a musical phrase making a definite passage in itself, such as the first two measures of *America* or of *The Star-Spangled Banner*, often called a *motif*. After the pupil has looked at it, have it rubbed out, and let him sing it as a whole and not endeavor to spell it out from note to note. This ability to fuse the three sets of general ideas into a specific one must take place in connection with such a *motif*, for such fusion cannot take place if the pupil is thinking simply from note to note. Intelligent reading other than musical reading requires the seeing not only of words as wholes, but of words in groups which form a particular part of the sense. This is a point much emphasized in beginning reading with little children. This capacity is essential for the reading of music; but in music it has a double value. Not only does it help in reading, but it gives an opportunity for discerning the concrete musical ideas essential to all musical enjoyment. In suggesting the writing and rubbing out of motives, we have given only one of many ways which the teacher can employ in accomplishing this result.

The ability to conceive and produce motives that combine to constitute a song prepares us for the third important phase of music-study: the grouping of these motives themselves in larger musical works. The fugue, the sonata, the symphony are but complex and elaborate developments of a few fundamental motives. The more clearly one can grasp the *motif* and the greater the tenacity with which he can hold it in memory, the more effective and vigorous will be the material of his musical appreciation and the greater the likelihood of his grasping the artistic purport of what he hears.

Instrumental music offers the most effective material for the development of this capacity. The instrumental teacher, instead of limiting his pupils to the musical experience of the pieces they themselves can play, should widen their experience not only by his own playing but by arranging for them to hear others play. Such hearing, however, will lose much of its educational effectiveness, since pupils are in danger of being overwhelmed by the complexity of these larger compositions, unless the teacher guides them by showing them how to concentrate their attention so as so observe the structure.

Modern invention has very greatly widened the possibility of such study. By means of perforated discs and rolls (see PIANO-PLAYER) it is possible to hear music, both in quantity and quality, that a few years ago was available only for exceptionally situated persons. Firstclass schools feel the necessity for a projection-lantern as an aid in making concrete the material of nature-study, geography, history and the like; and it will not be long before such schools will feel the necessity of supplementing this with instruments by the aid of which the best musical compositions can be heard as many times as are necessary for training in musical appreciation.

With the insight which is given by the tracing of the subjects and the motives of which they are constituted comes an awakened interest, not only in the compositions themselves, but in their composers and the times in which they were produced. Thus the personal, technical training widens into its artistic and human interests, and supplies material not only for the foundation work of those who go on to the study of applied music in some of its multitudinous forms, but for all those who are moved by the concord of sweet sounds.

CHARLES FARNSWORTH.

Mu′sical Notation. Musical notation is generally spoken of as the art of representing tones by written or printed characters. This, strictly speaking, is true only for a few individuals who have such accurate tone-memories that a single note on a page will awaken in their minds the exact pitch it represents. For the majority of music-readers the notation awakens first in the mind general ideas, the combination of which enables the reader to think the given tone from its notation. In this article the various characters of musical notation will be grouped according to the ideas that they awaken. These can be classified in two large divisions: *i. e.*, those of structure and those of interpretation. If one will think over the tunes of *Yankee Doodle* and *America*, he will have in his mind the forms of two distinct tone-designs, and it makes no difference with these designs whether they are shrieked out on a circus calliope or artistically rendered by a concert violinist; the designs of the two tunes remain unaltered in each performance. Ideas that have to do with this form or design of the tune we put under the division of structure; but, when we turn to the manner of the performance of these tunes, we find that we have definite ideas also. We wish *Yankee Doodle* to go in a tripping, gay manner, while *America* requires a dignified, stately and slower fashion; and we see an infinite difference between the performance of the calliope and that of the concert artist, because of the ideas of interpretation which are added to those of structure.

Musical notation deals chiefly with the ideas of structure, and these will be chiefly considered in this article. When one hums *America*, a regular pulsation is set in motion, as "loud, soft, soft, loud, soft, soft" by means of which a definite time-unit is established, called the beat or pulse. When one hums *Yankee Doodle*, he also find a pulsation forming groups, but in this case it is one loud and one soft. These tunes, then, represent two kinds of grouping — by two and by three — and such grouping is not peculiar to these tunes, for there are many others that fall into the same two classes, showing that it is possible to form ideas of time-units independently of any tune. Such effects we shall call ideas relating to pulse-grouping, the first of the three classes into which structural ideas will be divided.

If one hums *America* again, he will notice that, though the first three tones exactly coincide with the first three pulses, the fourth tone extends over the pulse and the fifth tone is shorter than the pulse, while in *Yankee Doodle* most of the tones are just twice as fast as the pulse. Here we have ideas of tone-duration, based on very simple yet exact arithmetical proportions. We can think of tones lasting two pulses or one pulse or of two tones in one pulse, without having to think of any definite tune. Thus we perceive ideas of tone-duration, forming the second class of structural ideas.

Turning again to *America* and *Yankee Doodle*, the tones are not arranged in a haphazard way, but the pitches selected are in certain definite relations to each other. This relationship is known as the key. We can think of a tone as being in a key, independently of any tune, thus forming the third class of structural ideas. The combination of these three classes of ideas in a musically logical way, expressed in a series of sounds, gives, not a general idea, but a specific, definite tune.

Turning to the characters that awaken the first class of ideas — those of pulse-grouping — one finds at the beginning of every tune two figures arranged one above the other. The upper figure agrees with the pulse grouping: in *America* three; in *Yankee Doodle*, two. Taking the fourth tone in *America* and the fifth in *Yankee Doodle*, we find that both are preceded by a vertical bar, which indicates that these tones fall upon a strong pulse. Thus the vertical bar groups pulses into measures, and the figure at the beginning states how many pulses there are in each measure: whether it be one strong and two weak in *America;* or one strong and one weak in *Yankee Doodle*. It is obvious that, if the notes in these measures are to represent the time of just three or just two pulses, the relation of the note's length to the pulse must be defined. This is done by the lower figure at the commencement of the tune, the four showing that the time-duration used is to be represented by a quarter-note; hence in *America* three quarter-notes or their equivalent will fill the measure and in Yankee Doodle two quarter-notes or their equivalent. In some tunes the figure two or the figure eight may be the lower one, showing that the pulse is either a half or an eighth-note. Pulse-grouping is further suggested to the eye by so arranging the notes in the measure both by spacing and by connecting lines as to suggest the pulse to which they belong.

Turning to the characters that awaken the second class of ideas — those of relative tone-duration — we find that this is accomplished through the shape of the notes themselves. Notes have heads, stems and a mark called the flag, often going from the stem of one note to the stem of another. A circular note without a stem represents a whole note; such a note with a stem, a half-note; a note with a black head and a stem, a quarter-note; when to such a note is added one flag or bar, it represents an eighth-note; and the addition of a flag or bar doubles the denomination. Most pieces of music require not tones only, but silences, to complete the design. In order to be able to mark the relative duration of these silences as they occur in the measures, each one of the above notes has a corresponding rest; the whole rest is an oblong black mark generally attached to but under the third line of the staff; the half-rest is a similar mark above the line; the quarter-rest is somewhat like an abbreviated two, or often like a seven turned the wrong way L; while the eighth rest is like the figure seven; by adding more heads to this last stem, we represent the rests of the higher denominations. Besides these notes, marks are used, such as ties, combining notes or rests in one long tone equivalent to their united value. A dot may be placed after a note, adding half the value of the note it follows. A second dot may be added, adding half the value of the first dot, or a dot may be placed over the note with a curve over it, meaning that the note shall be prolonged an indefinite length of time, generally from two to four times its regular length.

The characters that suggest the third class of ideas — those dealing with differences in pitch — consist first of a series of five lines called the staff, with short lines added above and below as required, called leger-lines. By placing the heads of the notes on the lines and the spaces adjoining them, the relation of the pitches of these notes to each other is suggested to the eye. If the piece of music requires very low and very high tones, a number of staves may be placed one over the other and united by a brace at the beginning; or the figure eight with a curved line following may be placed above or below a passage, showing that it shall be thought of as being an octave higher or lower than written, the word *loco* showing when the effect of such mark ceases.

Pitch-representation requires that not only the relation of the tones to each other shall be represented, but their exact pitch, on an instrument for instance; hence to the staff are added the fixed pitch-names of tones. These are designated by the first seven letters of the alphabet, repeated with special marks for each octave. If once-marked G is written on the second line of a staff, it will enable the staff not only to represent that tone as being in certain relationship to the tones on the other lines and spaces, but to represent the exact pitch of G — in this case in the treble voice. The clef-mark used to represent music for women's and children's voices is nothing more than such an ornamental G which, by showing the exact pitch of the second line of the staff, necessarily fixes the lines and spaces of all the rest of the staff. Similarly, a mark is put on the fourth line of a staff intended for men's voices, called the F clef, thus naming the exact pitch of the fourth line and, by this means, of all the other lines and spaces of this staff. Picture-representation requires a third group of signs in order to depict more exactly the relationships of the notes on the staff. These marks are sharps and flats, which enable the line or space on which they are placed to represent a pitch a half-step above or below what they would ordinarily suggest, or double sharp and double flat, enabling the line or space on which they are placed to represent a whole tone above or below the normal. The use of these necessitates another mark called the "natural" or "cancel," which shows that the line or space is being used as it was before the sharp or flat was placed. Sharps and flats are not only sometimes used before the notes they are expected to alter, but are grouped at the beginning of a piece, according as the key requires. Such grouping is called the key-signature.

This completes the survey of the most important characters for awakening the ideas of pulse-grouping, duration and pitch, necessary for forming the special idea of a given tune. Besides this, as was suggested at the opening, marks are necessary to indicate how the piece shall be performed or sung. These consist partly of signs, as dots, placed over notes showing that they should be performed in a disconnected way, or curved lines, showing that the notes included are to be connected, since they form part of the same musical phrase. The letter "f" from *forte* (Italian for *loud*) is used to show that the passage is to be performed loudly, and the letter "p" from *piano* (Italian for *soft*) when the opposite effect is required, and these may be doubled or tripled for greater intensity. Or a mark like the letter "v" placed on its side may be placed over a note, showing that that particular note is to be emphasized. If a still stronger effect is required, an "sfz" or "fz" may be placed over the note. If the passage is to be made gradually stronger and then softer again, radiating and converging lines may be placed over it. If a passage is to be sung gradually slower or faster, the abbreviation "rit." or "acc." may be placed. To decide the general style of the performance, words, largely derived from the Italian, are written at the beginning of the piece: such are *largo*, slow, solemn; *andante*, with flowing, moderate movement; *allegro*, in a rather quick and lively manner; *presto*, very fast and energetic. This is sufficient to illustrate, but by no means exhaust, the marks and words used for suggesting ideas of interpretation. Besides general cyclopedias and dictionaries, there are the musical dictionaries, as Grove, Riemann, Elson and Baker. CHARLES FARNSWORTH.

Musk, a substance obtained from the musk-deer (which see) and used as the basis of costly perfumes. That imported from Tonquin, China, is the best. Cheaper varieties come from India and Siberia. It is also used in medicine.

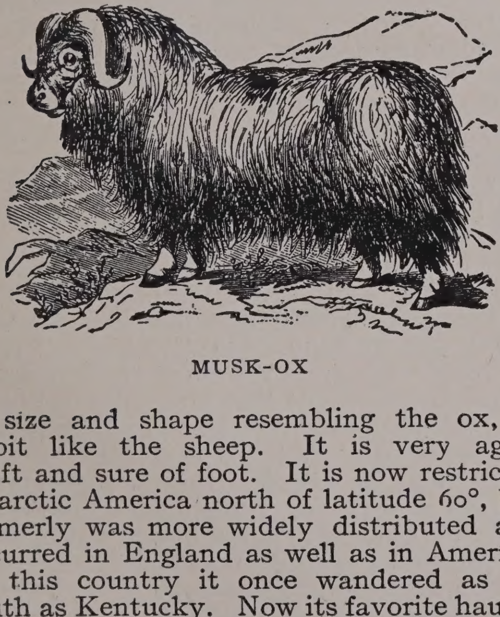
Musk-Deer, a small deer separated from others by having no antlers in either male or female. The male, however, has sharp tusks projecting downward from the upper jaw which are used in fighting. These animals inhabit the high plateaus of Central Asia, usually living solitary and never in herds. They are shy, feeding mainly at night, and on account of the difficulty of approaching them they are usually caught in traps. A full-grown specimen is about three feet long and 20 inches high at the shoulders. They vary in color, but are commonly grayish or yellowish-brown, and whitish below. The musk is found in a sac the size of a very small orange, situated on the under surface of the abdomen. The sack contains an ounce or more of the crude musk, which is so powerful in odor as to nearly overcome those who skin the animal and remove the pouch. When fresh, the substance is said to resemble moist gingerbread in color and consistency.

Muske'gon, Mich., is situated four miles from Lake Michigan on Muskegon Lake, which is really a widening of Muskegon River and affords one of the finest harbors on the eastern shore of Lake Michigan. Muskegon is 40 miles northwest of Grand Rapids. It has a large number of good industries, including manufactures of electric cranes, motors, boats, billiard-tables, bowling-alleys, underwear, boilers, pianos and furniture.

Muskegon is noted for its many fine educational advantages, which include a magnificent manual-training school presented by C. H. Hackley and endowed by him with $610,000. Mr. Hackley has also endowed the public schools of Muskegon with an amount which will probably reach $1,500,000 in the near future. Muskegon is the tenth largest city in the state, and has a population of 42,000.

Musk'mel'on, various forms of *Cucumis melo*, a genus of the gourd family and native to southern Asia. The cultivation of muskmelons has become a very important commercial enterprise in North America. There are two general types in the market: (1) the furrowed kinds with hard rind, known as cantaloupes, and (2) the netted kinds with softer rinds, known as nutmeg-melons. The nutmeg-melons are those most commonly seen in the early markets; while the cantaloupes are longer-seasoned varieties. An important strain of the nutmeg type has recently become prominent under the name of osage-melons, which were developed in southern Michigan. Muskmelons are a staple food among the inhabitants of Persia, Egypt and Italy. Muskmelon growing is extensively carried on in the southern states, and the Mississippi valley in general is peculiarly adapted to the industry. However, New Jersey as yet supplies half of the market-crop. See CUCUMIS

Musk-Ox or **Musk-Sheep,** an animal combining characteristics of the ox and sheep; in size and shape resembling the ox, in habit like the sheep. It is very agile, swift and sure of foot. It is now restricted to arctic America north of latitude 60°, but formerly was more widely distributed and occurred in England as well as in America. In this country it once wandered as far south as Kentucky. Now its favorite haunts are the upper tributaries of Mackenzie River and the region about Great Bear and Great Slave Lakes. It is a strange-looking creature, appearing to be a low mass of hair of great length and thickness, tangled at the shoulders. The legs Hornaday describes as short and post-like: the head is massive; the tail very short; the horns meet in the middle of the forehead and curve downward and outward, and the tips point upward. The coat next the body is very fine and soft, of a light brown color; the outer hairs are coarser, darker, sometimes a foot long. The hairy coat is shed during hot weather. A full-grown male reaches a weight of 450 pounds. The animal gets its name from its peculiar musky odor, concerning the origin of which there is doubt. They live in herds of 20 or 30 or upward, feed on grasses, lichens, moss, willow and pine-shoots, and are hunted for food.



MUSK-OX

Musk'rat or **Mus'quash,** a water-rat peculiar to North America, found from Labrador to Alaska and south to Louisiana and Arizona. Although adapted to an aquatic life, muskrats spend much time on the shores of the lakes and rivers they inhabit. The animal is the largest of the rat family, being about one foot long without the tail, which is six or eight inches in length. The latter is different from the tail of any other rat, being scaly and flattened from above downward. The fur is a dark, glossy brown above, paler and more silky underneath, is of commercial value; in the present scarcity of fur much is sold as mink and martin; when dyed, as French seal. Muskrats are great divers and swimmers, and resemble the beaver in being clever house-builders. They live in burrows in the bank, with one or more entrances under water. For winter they build dome-shaped houses of sedges and grasses plastered together with mud. These project above the surface of the water, but the entrances are underneath; here they sleep and bring up their food to eat at leisure. They feed mainly on roots and stems of water-plants. They raise their young in homes high up on the banks, there being two or three litters a season. Otter and mink are among their enemies, and the great horned-owl is a deadly foe. Warning of approaching danger is said to be communicated from one to another by slapping the water with the rubbery tail. The tail is used as rudder and propeller in swimming, and furnishes a "third leg" when the muskrat stands upright on shore, as he has a habit of doing, presenting a most amusing figure when looking the landscape over. The muskrat gets its name from its pronounced odor.

Mussel (*mus'l*), the common name for a number of bivalve mollusks. The common mussel of salt water (*Mytilus*), living along the shores of the northern Atlantic, is often eaten in Europe, but rarely in America. It is abundant between high and low water marks, and is usually anchored by a tuft of yellowish silken filaments (*Lyssus*) spun from glands in its body. The common fresh-water clam is the fresh-water mussel. These mollusks belong to the group of *Lamellibranchiata.*

Musset (*mü'sä'*), **Alfred de,** a noted French author, was born at Paris, Nov. 11, 1810, the son of an officer in the war-office. At nineteen he published his *Tales of Spain and Italy,* a volume of unequal verse. In 1833 appeared two of his greatest works, the tragical comedies, *André del Sarto* and *Marianne's Caprices.* Next followed the famous poem of *Rolla.* He always was as unsteady in character as in genius, and the feverish activity that sometimes seized him spent itself in splendid plans and unfinished poems. In 1840 his health broke down, and he wrote but little. As Heine said, he was "a young man with a splendid past;" he felt himself an old man at 30. The success of his play, *A Caprice, in* 1847, put life into him for a short time. He died at Paris of heart-disease, May 1, 1857. *The Night of May* and *The Night of October* are perfect and undying lyrics. As a poet of passion he comes close to Byron in power. His plays have not their equals in 19th-century literature for originality, wit and real dramatic genius. His largest prose-work was the famous *Confession of a Child of the Age;* but greater are his short stories and tales as *Emmeline, Pierre and Camille, Mademoiselle Mimi Pinson* and *Margot.* De Musset's whole work fills but ten small volumes, but they include some of the finest poetry, greatest plays and best short stories in French literature.

Mussolini, Benito(*mōō-sō-lē'nē, bĕ-nē'tō*), the Italian statesman who founded modern Fascism, was born in 1884 at Dovia in the Province of Forli, Italy. His father was a blacksmith and had internationalist revolutionary opinions; his mother had been a school teacher and was deeply religious. He was given a good education, and at the age of eighteen he had qualified as a school teacher. In his youth he became an exponent of Socialism. After two years of teaching he went to Switzerland, where he attended courses at the universities of Lausanne and of Geneva. He was awarded a diploma as a teacher of French, but his advocacy of Marxian Socialism caused his expulsion from Switzerland in 1904. He returned to Italy and served his prescribed term in the army. He then took up teaching again. In 1908 he went to Trente, which was then under the control of Austria. He here pursued his studies further, devoting his attention to German literature and taking a deep interest in philosophy. His Socialistic activities and his writings, which were partial to Italy, finally caused his expulsion from Austria.

Mussolini now returned to Italy and for a time devoted himself chiefly to Socialism. At Forli in 1910 he founded and edited the paper, *Lotta di Classe.* At Milan he edited *Avanti,* 1912-14. He had become a director of the Italian Communist party, but in 1914 was expelled from it because he favored Italy's participation in the World War on the side of the Allies. In 1915 he established the newspaper *Popolo d'Italia,* as an instrument for the exposition of his ideas. During the World War, he served as a corporal in the Bersaglieri. He was badly wounded in February, 1917, and upon his recovery returned to editing his newspaper.

BENITO MUSSOLINI

In 1919 radicalism and communism came to the front in Italy, and in opposition to these activities, Mussolini organized the first "Fascio di Combattimento." This was the start of present-day Fascism. Premier Facta and his government proved impotent to deal with the growing "Red" unrest. Fascism spread throughout Italy, and Mussolini reorganized and consolidated the party. In 1922 he became convinced that the time for bold action was at hand. On October 22, 1922, the Fascist Congress convened at Naples, and demands were made that Mussolini be placed at the head of the Italian government. Premier Facta and his Cabinet resigned. After Salandra failed to form a government, the King sent for Mussolini. The latter formed a Cabinet in seven hours, which, however, included several non-Fascists.

Soon Mussolini had concentrated power in the Fascist party. He conducted the government in a stern and resolute manner. He personally held the principal Cabinet portfolios, and he immediately took active steps to improve the nation's situation in both domestic and foreign affairs. Arbitration of industrial disputes was made mandatory. The electoral laws were changed so as to insure his continuance in office. Censorship of the press was established. Many of the prominent anti-Fascists were driven into exile.

In 1929 Mussolini resigned all his Cabinet portfolios, excepting the Premiership and the ministry of Foreign Affairs. In the same year the sixty-year-old dispute between the Italian Government and the Roman Catholic Church was terminated largely through his efforts. In 1931 the Church withdrew from political activities as a result of negotiations conducted by him. In 1933 Mussolini sponsored the four-power peace pact, which was signed by Great Britain, France, Germany and Italy. See FASCISTI.

Mutsuhito (*moot'soo-hē'tō*), Emperor of Japan, was born on November 3, 1852, in the temple-palace of Kioto. With the "Era of Enlightened Peace" of Japan, which dates from 1868, will always be associated the name of the famous emperor whose reign coincided with the renaissance of the empire. Cromwell and Washington refused crowns, but to Mutsuhito belongs the singular distinction of resigning despotic power. There is no other instance recorded of voluntary delinquishment of an autocracy held in one family for twenty-five centuries.

The little crown-prince who was to figure in such startling changes was in his third year when Commodore Perry forced the *shogun* to open the harbor of Yedo to American trade. In 1865 daring young nobles, leaders of the revolution, who had returned from abroad with a definite and complete program of deposing the *shogun* and forming a modern empire, decided to take Kioto by assault and restore the emperor to active rulership. They revered him and everything in the ancient history of Japan that he stood for. As a matter of wise public policy they knew that only around the sacred person of his majesty would all the warring clans of the country unite; only against him would the *shogun* be powerless, only to him as the supreme authority would foreign powers defer. Nevertheless, they were determined to form the mind of their young ruler and to model Japan after western governments. They got near enough to fire the sacred city but were driven back by the forces of the *shogun*. The imperial court watched the flames from the palace-walls, watched them die down, but they could not have known the cause or meaning of the conflagration. The emperor died on Feb. 3, 1867, unaware that the war-vessels of 18 powers were anchored in the harbors of Japan, the empire rent by revolution, the *shogun* tottering to a final fall. He left a 15-year-old successor who knew as little of all these startling changes as we know of the planet Mars.

The leaders of the revolution let the foreigners into the secret that they had been hoaxed and that the supreme authority over Japan was not in the *shogun* but in the hermit-emperor at Kioto. The fleets sailed away to Osaka, the port of Kioto, to support the revolution. The city was stormed, the palace-wall scaled, the boy emperor whisked out by night to the neighboring castle of Nijo and then, in what bewilderment may be imagined, took the oath to carry out the national will of Japan. Then he was whirled away to Yedo, which was forthwith christened Tokyo or Eastern Capital, blinking in the light of an amazing day. The *shogun* abdicated and the *mikado* was set up on the temporal throne of an oriental empire that was committed to policies of reform, progress, representative government and friendly relations with a world which, he learned, is round and inhabited by many peoples who had power to coerce Japan. That the young ruler was a man of remarkable intellect and character is proved by the rapidity with which he adjusted himself to kaleidoscopic changes. From a contemplative recluse set apart for the worship of a people he became a modern man of tireless activity and democratic ideas. He was fortunate in being surrounded by wise and patriotic advisers. Under their direction he made no mistakes, and he was so apt and eager a pupil that in a few years he was the real impetus in the forward march of the empire. He went about the capital in western dress, like any European sovereign drove in public with the empress, and entered Crown-Prince Yoshihito in the public university. In the Japanese empire he occupied a place similar to that of Queen Victoria over the British. He had no political bias. The power of veto rests in the premier and the imperial council.

Dying in his 60th year, every one of Emperor Mutsuhito's seven decades of life had seen dramatic changes. The first was the hermit life. In the second the revolution stripped him of spiritual, but restored his family to temporal, power. The third decade he was engaged in directing national consolidation and evolution into a constitutional government. In the fourth he deliberately limited his own prerogatives and powers, and launched the new ship of a self-governing state. In the fifth he waged war with China over a threatened Chinese protectorate in Korea, relieved his empire from consular courts and recovered the right to regulate foreign trade. In the sixth his armies defeated one of the greatest western powers.

Mutualism (*mū'tū-al-iz'm*), (in plants), that form of symbiosis in which the two plants are of mutual benefit. By many this condition is thought to be illustrated by the lichens, the algæ and fungi constituents being thought to be mutually helpful. See SYMBIOSIS.

Mycelium (*mī-sē'lĭ-ŭm*), (in plants), the ordinary body of a fungus, consisting of branching, colorless threads more or less interwoven. Sometimes the threads are so loosely interwoven, that the mycelium resembles a delicate cobweb; at other times so closely, that the mycelium becomes a felt-like mass. The latter form of mycelium may often be seen upon preserved fruit or jelly, in which case it can be removed like a thick piece of felt. See Fungi.

Mycenæ (*mī-sē'nē*), a very old city in the northeastern part of Argolis, in the Peloponnesus, built upon a high crag and said to have been founded by Perseus. It was the capital of Agamemnon's kingdom, and at that time the chief town of Greece. It was destroyed by the people of Argos, and, though rebuilt, never afterward prospered. Its ruins are still to be seen. The most celebrated of them are the Gate of Lions and the Treasury of Atreus. Excavations carried out by Dr. Henry Schliemann brought to light, in 1876, another underground treasury and several ancient tombs, vases, weapons, gold death-masks and other ornaments of hammered gold. These objects seem to show a type of art coming from Mesopotamia through Phœnicia and Asia Minor, and manifesting little or no trace of Greek tastes or customs. Their date seems to be about that of the Doric invasion of the Peloponnesus.

Mycorrhiza (*mī'kŏr-rī'zȧ*), (in plants), The name means root-fungus, and refers to the fact that there exists an intimate association between certain fungi of the soil and the roots of higher plants, as orchids, heaths, oaks and their allies. The delicate mycelial threads of the fungus spread through the soil, enwrap the rootlets with a mesh of threads, and penetrate into the cells. By this means the fungus obtains food from the rootlet as a parasite. But it is also thought that the fungus threads spreading through the soil are of great service to the host-plants in aiding their rootlets in absorbing. If this be true, there is a mutual advantage in the association, for the small amount of nourishment taken up by the fungus is more than repaid by its assistance in absorption. See Mutualism.

My Old Kentucky Home. Words and music by Stephen Collins Foster (1826–64). One of the most beautiful of American folk-songs. It is marked by the simplicity and pathos characteristic of the best of Foster's 160 songs.

Myriapoda (*mĭr'ī-ăp'ō-dȧ*), a class of jointed animals containing the centipedes and thousand-legged worms. The name signifies many-footed. The body is worm-like and jointed. There is a pair of legs for each joint. The head carries antennæ, jaws and eyes, and there is no distinction between thorax and abdomen. The myriapods form a group equivalent, respectively, to that of the crustacea, spiders and insects, and these four classes make the subkingdom of arthropoda. See Arthropoda and Centipede.

Myrmidons (*mẽr'mĭ-dŏnz*), the famous followers of Achilles in the Trojan War. They were an old Thessalian race who colonized the island of Ægina. According to Greek story Zeus peopled Thessaly by changing the ants into men; hence the myrmidons, which means ants.

Myrrh (*mẽr*), a gum-resin produced by a tree growing in Arabia and in Somaliland, Africa. The myrrh tree is small and scrubby, spiny, with whitish-gray bark, with smooth, brown fruit about as big as a pea. The myrrh flows from the pores of the bark in oily, yellowish drops, which slowly thicken, harden and become darker colored. Myrrh was known and highly valued in very early times. It was among the presents which the wise men from the east brought to the Christ-child. Myrrh is sold in tears and grains or in irregular-shaped and various-sized pieces, yellow, red or reddish brown in color. It was used by the Egyptians in embalming, and is employed now in medicine. All myrrh comes from Aden or from Bombay.

Myr'tle, a beautiful evergreen shrub or moderate-sized tree, with glossy leaves, black berries, having a pleasant, spicy odor and white flowers. This is the common myrtle, which is native to the countries of the Mediterranean. Among the ancient Greeks the myrtle was sacred to Venus as the symbol of youth and beauty. Victors in the Olympian games were crowned with wreaths of its leaves. It was frequently used at festivals, has frequent mention in poetry, and reference is made to it in the Bible. The Greeks used myrtle for their dead, the German maiden wears it on her wedding-day. In the United States the classic myrtle and other species are successfully grown as outdoor shrubs in California and the south. The myrtle of Peru and Chile has red berries and comparatively small leaves. The berries have a pleasant flavor and are eaten. The periwinkle, which is a very common running plant in the United States, is often improperly called myrtle.

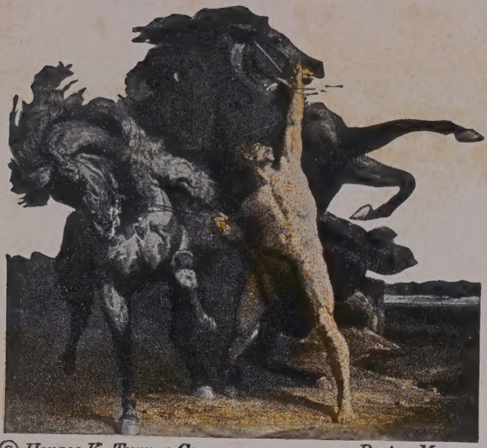
Mysore (*mī-sôr'*). See Bangalore.

Mytile'ne. See Lesbos.

Mythol'ogy. This term is used in two ways: properly it signifies the science of myths; but more commonly it is used to denote a collection or system of myths held by a certain people. Thus we speak of the mythology of the Greeks or of the American Indians. We shall first consider the latter use of the term. The most splendid mythologies are those of Greece and, on a somewhat lower level, those of India and Scandinavia. These are described under the names of individual mythological characters of the countries named, as Ulysses, Indra, Norns, etc. We shall therefore speak especially of the lower forms of mythology.

A myth is a "sham history," a story held to be true and also important by a body of people, though in fact it is false. Mythology does not deal with the belief in gods, but

The Poetry of Art



Myth Allegory Legend

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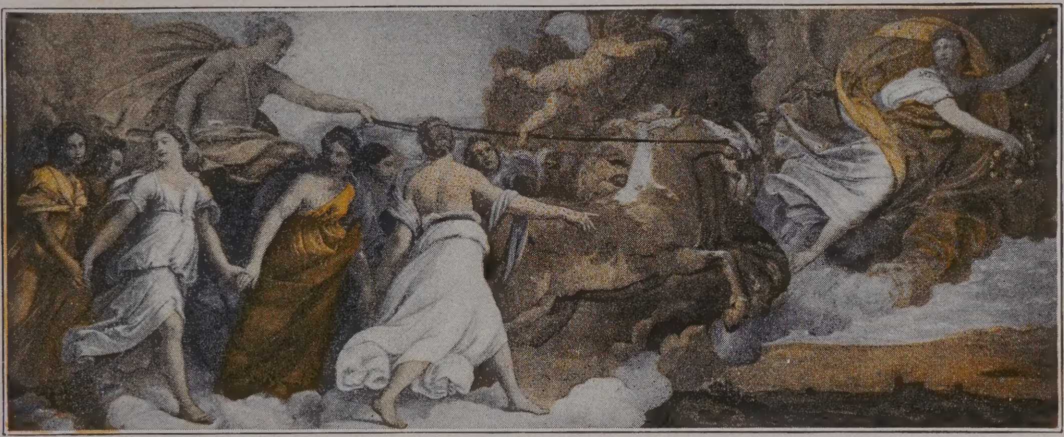
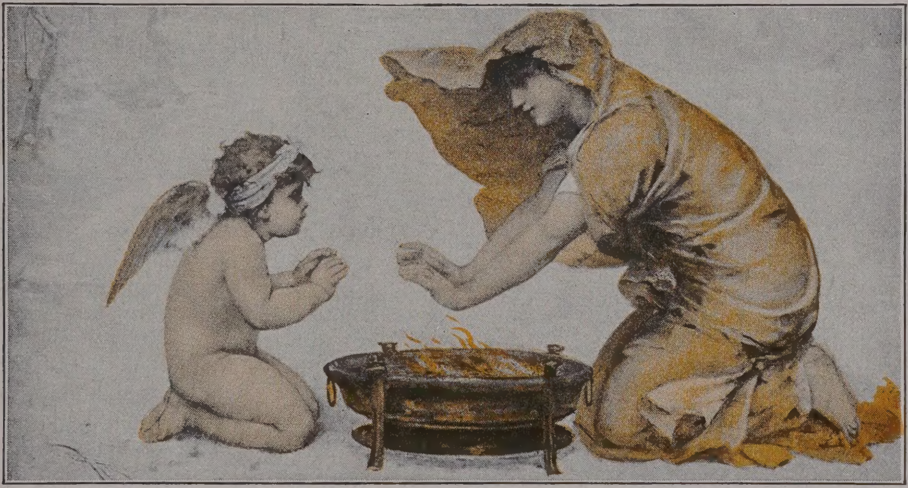
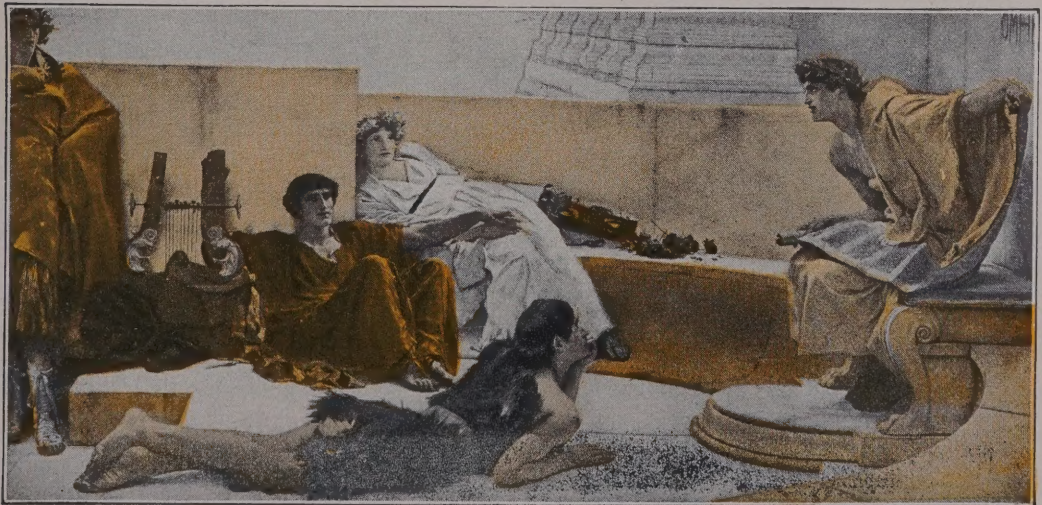
Automedon, with Horses of Achilles, by A. G. Regnault (French b. 1843)



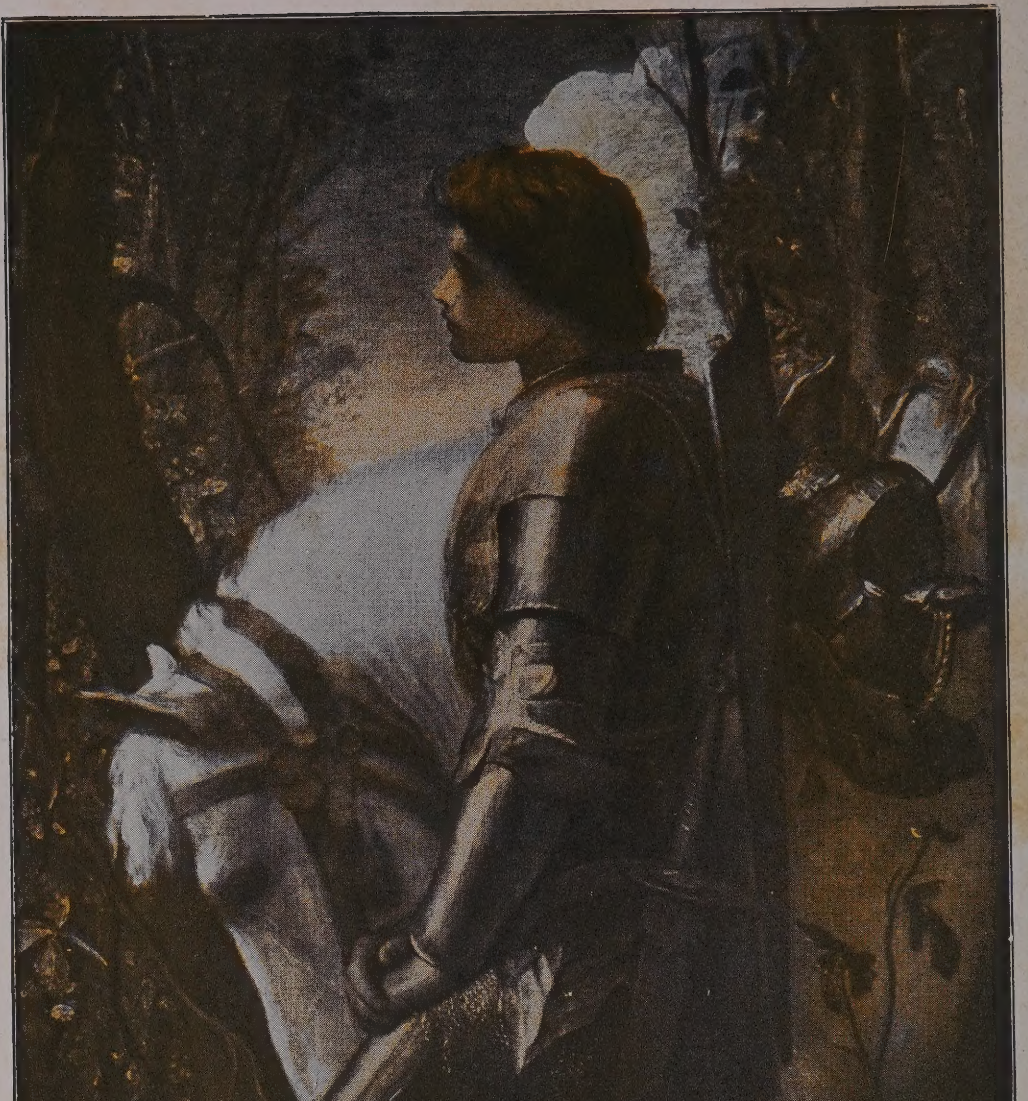
Aurora, by Guido Reni (Italian b. 1575) Palazzo Rospigliosi, Rome



Love Grown Cold, by Jean Aubert (French b. 1824)



A Reading from Homer, by Alma-Tadema (English b. 1836) ©H. K. Turner Co.



SIR GALAHAD—*George F. Watts*

His strength was as the strength of ten,
Because his heart was pure.

with the belief in *stories about* them. The lowest myths are those of such savages as the Hottentots, the native Australians and the Indian tribes in the northwest of this continent. These myths are *explanatory;* they "explain" some of the wonderful things which happen. Most wonderful is the beginning of the world. It was created, say the Australians, by Bun-jel or Pund-jel, apparently a monstrous eagle-hawk, who also taught men the use of the spear. The foe of the eagle and the source of mischief is the crow, another monstrous bird-god The bear and other animals also enter the circle of divinities; and among them appear sorcerers, sometimes human in form. All the lowest tribes have myths that tell of wonderful beast-gods,—insects, ravens and even the coyote. It is remarkable that in the mythologies of India and Egypt there are many myths told of gods that were more or less beastlike, and even in the mythology of Greece Pan had goats' legs and Zeus often took the form of some beast. There are to be found in most savage mythologies many striking resemblances, not only to each other but to the disgusting features present in the higher mythologies.

A slightly higher form of mythology is found among the Zulus. Their myths center around ancestors, especially the great Unkulunkulu. It seems that he not only is ancestor of all true Zulus, but is maker of the world. The sky, however, he did not make, and the thunder is caused by the thunder-bird, which may often be seen and even shot. Its fat has magical powers. The Zulus delight in tales which are very like some of the myths of the Greeks and also like many of our own nursery-tales. The myths of the Maoris of New Zealand are still higher in character. At first there were two great gods, man and wife, who had many children, whom they kept in darkness. Then one child led the others in revolt, and separated their parents, earth and heaven, keeping them apart forever. Then these children divided the earth and sea between them, each taking some department, one the fishes, another the reptiles and so on. Man was created by Tiki out of clay. Among them arose the hero Maui, who made the sun and the moon keep strictly to their course in the sky, by giving them a beating! He invented many arts for the good of man, as fire and fishing. At last he died in an attempt to pass down into the body of Great Mother Night, and safely through her and up to light again, even as the sun does every evening and morning. But a little bird awoke Night as Maui went down, and she closed on him and crushed him.

The Mexican mythologies were as absurd and monstrous as those of less civilized people; but the stories were more numerous and systematic. Our own barbaric ancestors believed many remarkable and ridiculous stories, besides those that are described in the mythologies of the Norsemen and Teutons. Some of these stories are still preserved in our nursery-tales. For example, it seems that Little Red Riding Hood is none other than the sun itself, according to the old German tale, and the wolf is the black night which swallows her. But in the old story, which is still told in Germany, the wolf is torn open, and out of it steps the little redcloaked girl, as bright as ever, being indeed the morning sun.

Later in history we hear of another class of myths, which we do not always think of as constituting a mythology, perhaps. These are the wonderful stories told of Arthur, king of Britain and defender of the Christian faith against the heathen Saxons; and the stories told of Charlemagne and of Alexander the Great. It is not certain that Arthur ever lived at all; if he did he was only a British chieftain, and his success against the Saxons was not great But the defeated Britons clung to his memory, and with each passing generation magnified the wonder of his exploits. Then the minstrels of the dark and the middle ages converted him into a king with all the characteristics of a perfect knight, although of such knighthood he could have known nothing. They gave him a Round Table of knights, and these knights had names. They found him a city, and described what it was like in its glory. They gave him a wife and told how she betrayed him. Though all this was mere imagination, much of it came to be accepted as truth. In like manner the exploits of Charlemagne and of Alexander were exaggerated and modified. Among these myths should be mentioned those of the *Nibelungenlied* (Siegfried, Gunther, Brunhild), which have been made the theme of many great operas They were confused with the Arthurian myths,—Tristram, Parsifal and others appearing in both series. But, whereas the Arthurian myths sprang from a small kernel of historic fact, it seems that the *Nibelungenlied* owed its origin to stories that should explain natural events.

We must not suppose that the age of myths and mythmaking has altogether passed. Besides the beliefs still held by savages and by the less educated classes in such countries as Russia, Japan, India and China, and beside the nursery stories,—the myths of Jack the Giant Killer etc.,—there is a constant tendency for stories to spring up in connection with such men as Washington and Lincoln, which appeal to our love of the great and marvellous. But the spread of science and the records preserved by our newspapers, with the love of accuracy fostered by our historians, tend to prevent the formation of fresh myths and to break down the belief in old ones.

If, now, we consider the *science* of myths, we find that it deals with the *comparison* of myths, in order to note their resemblances and differences; with the *classification* of myths; and with the study of the *causes* of myths. As regards the *comparison* of myths we have already noted the remarkable resemblance between myths taken from all parts of the world, even in those held by Australians and by Greeks. This is probably to be explained, not by supposing that these myths were formed when the ancestors of Australians, Negroes, Greeks and other races lived together, for it is doubtful whether they ever did; nor by supposing that the stories have spread from one nation to another, encircling the globe, for there are too many difficulties in the way, and there is no evidence of exchange in other things more likely to be exchanged. Rather the cause of this fundamental resemblance is simply that men are fundamentally everywhere much alike, and the world that they face is the same. Hence they came to invent everywhere much the same stories to make the world seem comprehensible to themselves. This comparison of myths also shows many differences between the myths of different races. Those of savages are marked by their monstrous and ridiculous character. The Hindu myths preserve the characteristics of immensity and indefiniteness. The Egyptian stories seem to be full of hideous and senseless details, whose use apparently was to show the people why they must observe certain rites and ceremonies which the priests required of them and also to inspire them with a fear of the strange and horrible deities. The Scandinavian myths are stories of strength and savage war, relieved by a peculiar rough humor and by touches of pathos. The Greek myths are distinguished, not only by the charm of the stories told, but by the definiteness and beauty of the personalities of many of the gods and heroes. The Romans borrowed practically all their myths from the Greeks, except perhaps the story of Romulus. The myths of the middle ages were marked by the large place that romantic sentiment played in them and by the frequent insistence on the higher virtues of honor and justice, compassion and courtesy.

With regard to classification, myths may be grouped under the divisions of theriomorphic and anthropomorphic myths. All myths give the forces of nature a personality: *theriomorphic* myths make the personality that of a beast, *anthropomorphic* ones that of a man. The former are the earlier myths, and are much more common still among savages; but, as pointed out above, remnants of such myths are found in the highest mythologies.

A better classification is according to the *purpose* they serve. Myths are *explanatory*, *esthetic* or *allegorical*. The first class explains the beginnings of nature and its wonders As subdivisions we may note myths that explain the beginning of the world, the beginning of man, the discovery of the arts, as firemaking, corn-planting (compare Hiawatha) and music; those that explain death, which to the savage seems unnatural; and those that explain the sun, moon and stars and other phenomena of the heavens. Finally there are myths that explain customs. For instance, the fact that an Indian tribe holds a certain animal or tree sacred is explained by saying that the tribe is descended from that animal or tree (compare *Exodus xiii*). The next class, the *esthetic* myth, deals with the great and beautiful. Of course many explanatory myths are esthetic also; for example, the myth of Hercules, wherein the hero turns Mount Atlas into stone, and thus "explains" it; and the myth of Theseus, whereby the name of the Ægean Sea, as well as many Athenian customs and practices, was explained. The finest of the esthetic myths are those of Greece, as the stories of Ulysses, Achilles, Jason, Perseus, Theseus and Hercules and the many stories of the gods and of the lesser divinities. Hardly less beautiful are the myths of the middle ages. Some of these were silly and tiresome; but in the myths of King Arthur and his knights we recognise the highest merit. The third type of myth, the *allegorical*, is represented by such stories as those of Baucis and Philemon and of Midas which convey a moral lesson. It is quite possible that these stories had some basis of truth; perhaps an old couple were preserved when some city sank into a lake. Then the story of the celestial warning slowly grew around the memory of the disaster. So perhaps Midas was indeed an avaricious king. Many of the fairy stories are allegorical; for example, the Beauty and the Beast. Ruskin's *King of the Golden River* is allegorical; but it is not a myth, because no one is expected to believe that it really happened. Many explanatory myths and many esthetic myths have an allegorical character also. For example, the myth of Hercules not only is explanatory and esthetic, but has always been used as an allegory of the selection of duty in preference to pleasure and ease. In most myths it is easy to find an allegory, but they are not truly allegorical, because that is not the main purpose of their existence.

Now let us finally consider the *cause* of myths. We have already seen that one cause is the astonishment with which the ignorant man of any age views the actions and the forces of nature. Next to *ignorance* and to *astonishment* or wonder we must place the delight that man has always felt in imagination. He imagined cause after cause of nature's wonders until he thought of something great or terrible enough to satisfy him. Then he said that that was and must be the cause. The fourth cause is man's tendency to think that other things are like himself. We often see men attribute such thoughts to horses and dogs as only men can have. Nowadays we are impatient with men who insist on doing this; but in former times every one did it and to a much greater extent. We speak of the angry sky, the threatening cloud, the fierce winds, the gentle breeze, the smiling dawn. But the savage and the man of former days share the belief that the sky really *is* an angry and threatening person and that the bright morning is indeed the smile of the sun god or goddess. A fifth cause of myths is the strange and lawless actions of our dreams; these the primitive man regards as information concerning another world, where things do occur in what we call the "crazy" fashion of our dreams. Thus many myths are just like nightmares, so horrible and impossible are they. Sixth among the causes we may place the reverence and fear that men have for the great dead, especially for ancestors. These they often seemed to see in dreams, as if they lived still. A seventh cause is the delight which men, as well as children have in a "make-believe" world. The myth-maker dreamed of a better world that perhaps had once been and perhaps again would be; and this dream he called true, because he could not bear to believe that there was no truth in it. As an eighth cause we may mention the activity of priests and moralists in inventing stories or altering traditions in such a way as to persuade people who believed their inventions to conform to the religious practices or the moral principles which were thought desirable. Probably this is the explanation of the myth that Apollo once came down from heaven to drive away some would-be robbers of his temple. Those who believed the story would be slow to incur a visit from the god. It is highly probable that a mere confusion of words sometimes gave rise to a myth among a wonderloving people. Thus, when men sang the words of some ancient poet, in which he told how the sun pursued the dawn, they may have believed that he described an actual pursuit of one deity by another; and thus arose the story of Apollo and Daphne.

We have therefore suggested nine causes for myths: (1) Ignorance, (2) astonishment or wonder, (3) delight in the play of the imagination, (4) personification, (5) dreams, (6) fear or reverence for ancestors or heroes, (7) delight in contemplating the ideal world, the world of make-believe, (8) allegorical teaching and finally (9) the misunderstanding of metaphors. This list of causes seems to include all that have been suggested by different writers on the science of mythology; but we should recall the theories of Euhemerus (316 B. C.) that myths are a mere perversion of traditions that described what actually had occurred long ago; of the Roman Stoics that all myths are allegorical; of Herbert Spencer that they owe their origin to ancestor worship; of Max Müller that they are based on the misunderstanding of metaphors; and of Grimm that they are the work, not of the learned few who would direct the many ignorant, but of the people at large.

Myxomycetes (*miks-o-mĭ-sē̆′tēz*), organisms commonly called slime-moulds, which do not seem to be related to any group of plants and have raised the question as to whether they are to be regarded as plants or animals. The ordinary body is a mass of naked protoplasm, called the plasmodium, suggesting the term slime. This body slips along like a gigantic amœba. Slime-moulds are common in forests, upon black soil, fallen leaves, decaying logs, and are slimy, yellow or orange masses, ranging from the size of a pin-head to that of a man's hand. In certain conditions these slimy bodies come to rest and organize elaborate and often very beautiful spore-cases. As is often remarked, the body of these organisms is animal-like, while the sporangia are plant-like.

N

N (*ĕn*), the fourteenth letter, is a voiced consonant. It is sounded through the nose while the tongue touches the upper front teeth, and is therefore classed as a dentonasal or linguanasal. It also is a liquid and even a semivowel. When *n* is followed by a guttural, they form one nasal, as in *ring*, or the *n* becomes more nasal and the guttural keeps its own sound, as in *rink*. If *n* and the following guttural belong to different syllables, *n* usually remains *n*, as in *engage*. Its commonest sound occurs in *done*, *nasal*, *ran*, but when followed by *k* or hard *g*, *n* becomes the *ng* of *sing*, as in *sink*, *single*. *N* preceded by *l* or *m* at the end of a word is silent, as in *kiln*, *hymn*.

Nadir (*nā'dẽr*), an Arabic word used by astronomers to denote the point just opposite the zenith. The *zenith* being the point immediately over head, the *nadir* might be defined as the point immediately under foot. A plumb-bob suspended by a string always points to the nadir and to the zenith, at the same time.

Nagasaki (*nä-gä-sä'kē*), a seaport town of Japan, for two centuries was the only harbor in the kingdom open to the world. In 1859 it became one of the five open ports. Its harbor is a beautiful inlet, of over three miles, having, near its head, the island of Deshima, which from 1637 to 1859 was the trading-post and prison-house of the Dutch traders. The great Takashima coal-mine on an island eight miles seaward, makes Nagasaki an important coaling-station. Its imports (besides tea and raw silk) include rice, textiles, porcelain and lacquer-ware. The foreign settlement is on the east side of the harbor. The city has English, American and Dutch missions and a community of native Christians. Population 176,480.

Nagoya (*nä'gô-yȧ*), one of the largest and commercially active cities of Japan, the chief town of the province of Owari, lies at the head of the shallow Owari Bay, about 30 miles from its port, with which it communicates by means of light-draught steamers. It is one of the largest seats for pottery-works, and turns out large quantities of fans and enamels. Nagoya Castle, in about 400 acres of grounds north of the city, was built in 1610, and is the headquarters of the Nagoya military district. A superior court, middle school, girls' school, normal school, hospital, prefecture, telegraph and postoffices are the buildings of foreign style. Population 378,231.

Nagpur (*näg'pōōr'*), a city in British India and capital of the Central Provinces. It is a beautiful town, well-wooded, having attractive gardens and suburbs, but its high temperature makes it unhealthy. It manufactures fine cloth-fabrics and has a good trade in wheat, salt, spices and European goods. Here 1,350 British under Colonel Scott defeated 18,000 Mahrattas on Nov. 27, 1817. Population 127,734.

Na'hum, the seventh of the minor prophets His book is inscribed *The Burden of Nineveh*, the book of the vision of Nahum the Elkoshite. Students have dated this prophecy between the fall of Thebes (666 B. C.), which is mentioned, and 606 B. C., the date of the destruction of Nineveh. Of Nahum's personal history nothing is known.

Nails. The making of nails by hand has been an established manufacture in Birmingham, England, for 300 years. Before the successful but very gradual introduction of machine-made nails, 60,000 men, women and children were engaged in the industry in that district. They all worked in small shops or sheds attached to their houses. In 1861 the number employed was only 20,000, and nearly half were females. Hand-made nails were supplanted by cut nails, which in turn have given way to wire nails, except for horseshoe nails. They are made by machinery from specially prepared steel wire. The wire is fed from a reel into a machine, and at each turn of the flywheel a nail is headed, pointed and cut off. The wire runs between rolls that straighten it and so cause the nails to be straight, and the length of the nail and the size of the head are made what is wanted. Five hundred small nails a minute can be made, or 125 large ones. Over 500,000 tons of wire are annually made into nails in the United States. New England is the center of American nailmaking; Taunton, Mass., the world's tackmaking center.

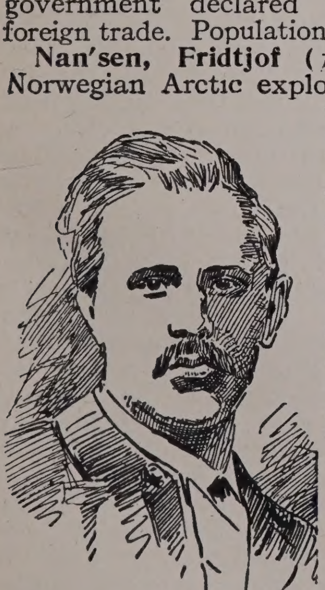
Nana Sahib (*nä'nä sä'hĭb*), the name applied to Dundhu Panth, the adopted son of a former ruler of the Mahrattas, when he led the Indian mutiny of 1857. He was born about 1825 and educated as a Hindu nobleman, but was active in stirring up dissatisfaction with English rule, and at the outbreak of the mutiny was proclaimed ruler and was directly responsible for the massacres at Cawnpore. After the suppression of the rebellion he fled to Nepal. The date of his death is unknown, probably 1860.

Nanaimo (*nȧ-nī'mȱ*), a city of 6,130 souls, lying on the eastern coast of Vancouver Island, British Columbia, is of great importance as a coaling-station, being the shipping port of the important mines near by.

Nancy (*nän'sē̇'*), capital of the French department of Meurthe-et-Moselle, lies on the left bank of the Meurthe at the foot of the hills. It comprises both the old and new towns, and contains fine squares and beautiful buildings, among them the Hôtel-de-Ville, the bishop's palace, the theater and the churches Des Cordeliers, Nôtre Dame de Bonsecours (1738) and St. Epvre. The statue of Stanislaus Leszcynski, king of Poland, who lived here from 1735 to 1766 as Duke of Lorraine, stands in the principal square. The city has manufactories of cotton and woolen goods, artificial flowers, iron etc., but its greatest industry is embroidery on cambric and muslin. From the 12th century it was the capital of the duchy of Lorraine; it also is the scene of the death of Charles the Bold, 1477, and the birthplace of Callot and Claude Lorraine. The town was occupied by the German army in 1870. Population 119,949.

Nanking (*nän'kĭn'*), capital of the province of Kiangsu (and formerly of China), is situated on the Yangtse, 130 miles from its mouth. Since the removal of the capital to Peking, the official name has been Keang-ning-fu. When it was the capital of the Taiping rebels from 1853 to 1864, the latter destroyed the Porcelain tower, the summer palace, the tomb of the kings and all the other buildings for which it was famous, and also part of the walls, formerly 20 miles around and in some places 70 feet high. Since its recapture it has recovered a little. The manufacture of nankeen and satin has been resumed. It was captured by the English in 1842. In 1899 the Chinese government declared Nanking open to foreign trade. Population 450,000.

Nan'sen, Fridtjof (*frēt'yŏf nän'sĕn*), a Norwegian Arctic explorer, was born near Christiana, Norway, Oct 10, 1861. When 21, he became curator of the zoological department of the museum at Bergen and devoted himself to its improvement. In a number of exploring expeditions he showed such fertility of resource and such physical endurance that he was given larger fields of operation. In 1882 he explored the seas about Greenland. In 1888–89 he crossed Greenland, passing over its ice-cap from east to west, and returned safe, contrary to the predictions of his critics. With his thoughts still on the problems of the polar seas he designed a boat in 1892 to withstand the effects of any ice-jam; and in this vessel, the *Fram*, he set out from Vardö, Norway, in 1893, intending to reach the pole by sailing east until the right opportunity should offer for permitting his boat to be frozen into the ice pack. It was his belief that the pack itself would drift him across the polar sea. His surmises were in part correct. He attained the highest latitude north, but not within many leagues of the pole. He was not heard of again until Aug. 13, 1896, when his safe return was announced. His farthest north was about three degrees farther north (86° 14′ N.) than the point attained by the *Alert* in 1876. His published works are *Across Greenland*, *Eskimo Life* and *Farthest North*. He lectured in the United States after his return from the polar expedition of 1893–96, upon which his chief distinction rests. Of late years he has been professor of zoology at Christiania University, and recently has acted as Norwegian ambassador to England.



FRIDTJOF NANSEN

Nantes (*nănts*, French *nänt*), the ninth largest city of France and capital of the department of Loire-Inférieure, lies on the right bank of the Loire, 35 miles from its mouth. Demolished between 1865 and 1870, Nantes has grown by nature and by art to be one of the handsomest cities in France. Its unfinished cathedral (1434–1852) contains the celebrated monument to the duke and duchess of Brittany. Among its noteworthy buildings are the ducal castle, the occasional residence of Charles VIII and the place where, on April 13, 1598, Henry IV signed the famous Edict of Nantes; the Church of St. Nicholas, the palace of justice, the theater, postoffice, museum and library of 50,000 volumes. Nantes, the former capital of Brittany, is the scene of the marriage of Anne of Brittany to Louis XI (1499), the embarkation of the Young Pretender (1745) and the arrest of the Duchess de Berri (1832). Population 170,535.

Nan'ticoke, Pa., a borough of Luzerne County, on a branch of the Susquehanna and on the Central of New Jersey, Delaware, Lackawanna and Western and Pennsylvania railroads, 20 miles southwest of Scranton and eight miles from Wilkes barre, the county-seat. A portion of the town, known as West Nanticoke, lies across the river in Plymouth township. Its chief industry is the shipping and hauling of coal, being in the anthracite coal-mining regions. The chief manufacturing establishments are mining and agricultural implements, flour and grist mills, lumber mills, cigar factories, a canning factory, hosiery mills, two silk-throwing mills and a large knitting factory. Population 26,000.

Nantuck'et, an island off the southeastern coast of Massachusetts. It is about 15 miles long and much frequented as a summer-resort. The town lies on the north shore. It formerly was a great whale-fishing center. Population, 3,220.

Naphtha (*năf'thȧ* or *năp'thȧ*) is derived from a Persian word meaning to exude and was originally used to designate the liquid hydrocarbons that ooze from the ground about the Caspian Sea. It was also applied to the natural oils, found universally, and to the oil derived from the Boghead mineral in Scotland. But since the discovery of Scotch paraffine and American petroleum the name has been applied only to the lighter, explosive and unsafe oils and, strictly speaking, to the products of distillation from mineral oils, coal-tar, india-rubber, bones, peat and wood, the latter being known also as methylalcohol. Petroleum (American) contains from 15 to 20 per cent. of naphtha, which is separated into gasoline, benzine and benzoline. The tar derived from the reduction of coal yields from 5 to 20 per cent. The spirit obtained from the destructive distillation of india-rubber is called caoutchin. Bone-naphtha or Dippel's animal-oil is obtained by distillation of bones in the manufacture of animal charcoal.

Napier (*nāp'yĕr*), Sir **Charles James,** a British general, the conqueror of Scinde, was born on Aug. 10, 1782, at London. Being commissioned in his 12th year, he served during the Irish rebellion, and, at the battle (Corunna) in which Sir John Moore died, he was five times wounded and taken prisoner. He served in 1811 in the Peninsula, where he took part at Coa, Busaco — where his jaw was broken and eye injured by a shot — Fuentes d'Oñoro and Badajoz. He also took part in the Anglo-American War of 1812. In 1818 he was made governor of Cephalonia; in 1838 a K. C. B.; and in 1841 was sent to India to command the army of Bombay against the Ameers of Scinde. Here his most remarkable feat was the destruction of the fortification of Emaun Ghur, 1843, followed by the battle of Meanee (Miani), where, with 2,080 English and Sepoys, he defeated 22,000 Baluchs. He died near Portsmouth, Aug. 29, 1853. See the biography by his brother and the short *Life* by Sir. W. Butler.

Napier, William Francis Patrick, K. C. B., brother of Sir Charles, was born near Dublin, Dec. 17, 1785. He served in the Peninsular campaign and retired as a lieutenant-general. He also wrote a famous *History of the War in the Peninsula, The Conquest of Scinde* and the *Life of Sir Charles Napier*. He died at Clapham, London, Feb. 10, 1860. See his *Life and Letters*, edited by Bruce.

Naples (*nā'p'lz*), until 1860 the capital of the kingdom of Naples, is the largest Italian city and one of the busiest ports, exporting wine, olive-oil, chemicals, perfumery, live animals, animal products, hemp, flax and cereals, and importing cereals, metals, cottons, woolens, earthenware, silks, groceries etc. The well-known proverb: "See Naples and die" originated on account of its attractiveness and delightful climate. Naples lies upon the base and sides of a hill-range rising from the sea and divided into two unequal parts. The most ancient part of the city, in the eastern crescent, is divided from north to south by its oldest street, Via Toledo (now Via di Roma), and is the most populous district of its size in Europe. Back of the wharf extending to Castel del Carmine lies the poorest and most densely-peopled quarter. The city is always full of life, the streets crowded and noisy. There are few buildings of any note, only the forts and gates, university, royal palace, catacombs, national museum and law-courts being worth a visit. It has three large libraries, the national, the university and the Brancacciana. The university, founded in 1224, has 81 professors, and 4,745 students. Population 723,208.

Naples, a former kingdom in southern Italy, owed its creation to Greek colonists, the two settlements, Palæopolis and Neapolis, long existing as one community, Parthenope. After the subjugation by Rome only Neapolis remained, and this became Rome's ally. After resisting Pyrrhus and Hannibal, it fell, by treachery, into the control of Sulla's friends, who murdered its people (82 B. C.). Under the empire it became a famous residence place on account of its poets and its climate. After the fall of Rome it sided with the Goths, but was taken by Belisarius (536) and, six years after, by Totila. Soon afterwards the Byzantine emperors acquired it through Narses, and it was made the head of a duchy. As such it revolted and remained independent until conquered by the Normans in the 11th century. In 1266 the popes gave the sovereignty of Naples to Charles of Anjou, but during the reign of Robert I the predominance of the papal party, the ravages of the Germans, the depravity of Juana, Robert's heiress, and the unsuccessful attempts to recover Sicily were the only important events that marked the Angevin rule, which ended with Juana II in 1435. Then succeeded the Aragon rule. Between 1494 and 1504 France and Spain fought for the possession of Naples, but it was united with Sicily, forming the Two Sicilies, and was governed by Spanish viceroys down to 1707. In that year Austria wrested Naples from Spain only to give it in 1735 to Don Carlos, who founded the Bourbon rule. In

1789 it was invaded by the French troops and in 1806, when Napoleon proclaimed his brother Joseph king. In 1808 the crown was given to Joachim Murat, but on his defeat and execution in 1815 the Bourbon monarch was restored. The revolutions of 1821 and 1848 led to the overthrow of the Bourbon government by Garibaldi and to the incorporation of Sardinia and Naples with the kingdom of Italy in 1861. Naples (Napoli) to-day is a province of Italy, with an area of 350 square miles, and a population of 1,354,896. See *History of the Kingdom of Naples* by Colletta, translated by S. Horner.

Napo'leon I, first emperor of modern France, was born at Ajaccio, Corsica, Aug. 15, 1769, of an ancient Italian family, and ten years later entered the royal military school at Brienne le Chateau, from which he was transferred to the military school at Paris. He graduated as second lieutenant, and began the ambitious career that characterized his after-life by entering the first revolution and attempting to seize the Corsican cities for France, but failing. As lieutenant-colonel in the second revolution, he attempted to capture Sardinia, but failing, he fled to France with his entire family, and looked here for glory and renown. He joined the army under Carteaux, and acted as chief of battalion against the Marseillais, and was promoted to general of brigade for planning and causing the fall of Toulon. He was given command of the army of Italy in February, 1796, and two days before entering upon the campaign he married Josephine, the widow of General Beauharnais. In Italy began the course which marked him as a man of determination, force and quick action, and by wonderful strategies he defeated the allied forces of Italy and Austria. In this campaign he lost not even a single engagement, but moved so rapidly and decisively, that with an army of about half the number of the allies he won repeated victories and levied large contributions from defeated towns. After his victory in Italy, he decided to move on Vienna, but Austria made overtures for peace, ceding to France Lombardy, Belgium and the Ionian Islands at the conclusion of the treaty.

On his return to France the directory, fearing that his ambition would lead him to foment a revolution for personal ends, placed him in command of the army of England, with which he determined to conquer Egypt and found an eastern empire. He reorganized the army and embarked from Toulon in May, 1798. Taking Malta on the way, he arrived at Alexandria and marched on Cairo, which he entered on July 24. His fleet was destroyed in the Nile by Nelson, and he turned his attention to Syria and formed a brilliant idea of overthrowing Turkey and entering Europe through Asia Minor and Constantinople. However, hearing that the armies at home were meeting with misfortune, he embarked for France secretly, leaving the army in command of Kléber. He arrived at Paris just in time to fill the want of the leaders, who were looking for a man to place at the head of the new movement. The revolution of Nov. 10, 1799, gave rise to the formation of a new constitution, which Napoleon assisted in framing, and by it the provisional government was vested in three consuls, of whom Napoleon was elected president. He thus became practically sole ruler of France. Then, in 1800, after failing to conclude peace with Austria and England, he determined to stake all on the chance of a campaign, and entered Italy desperate for victory. He was saved from defeat by Melas, on the plain of Marengo, by the timely arrival of Desaix's army. Upon Moreau's victory at Hohenlinden he made peace with Germany and England, gaining all of Italy.

He then turned his attention to the formation of the permanent civil institutions, restoring the church, establishing the judicial system, the codes, the system of local government, the university, bank of France and the Legion of Honor. This done and peace thoroughly established, he was fired by the ambition to become the ruler of the world, and after being elected first consul for life, he ruptured the peace with England by proceeding upon Holland, Genoa and Piedmont, demanding that England should suppress all papers criticising his actions and drive all French refugees from its shores. He entered Germany, seized Hannover and assumed the crown. He then roused the royalists by executing the Duc D'Enghien, and, winning the republicans over to his way of thinking, he chose the title of emperor, which was confirmed by the senate, May 18, 1804. The advance upon England was met by a coalition of England, Austria, Prussia and Russia; but Napoleon, nothing daunted, marched upon Austria and defeated her at Austerlitz in December, 1805, breaking up the coalition. But Prussia gathered her armies in August, 1806, and was joined by Russia. They were defeated at Jena and Auerstädt on Oct. 14, and Berlin was taken on Oct. 27. Then the Russians were defeated at Friedland in June, 1807, and by the ensuing peace Prussia lost half her territory. Napoleon's great aim was the humiliation of England, and to this end he caused all continental ports to be closed against her; but England retaliated by defeating his army in Spain and Portugal. In Germany, also, revolt was rife, Austria leading the way, and after several attempts to cross the Danube, Napoleon defeated them at Wagram, July 5, 1809, and received a large part of their territory as indemnity. He, however, greatly offended the czar by giving Galicia to Poland. His wife bearing him no children, he divorced her and married Maria Louisa of Austria, by whom he had a son.

His persistency against England brought him into conflict with Russia, and Napoleon determined to invade that country. So, with 600,000 men, he crossed the continent, being greeted by the king of Prussia and emperor of Austria, and entered Russian soil on June 24, 1812. He defeated the Russians at Borodino and entered Moscow on Sept. 14, on which a great fire broke out and lasted until the 20th. He resolved upon a retreat on Oct. 18, and upon reaching the frontier had but 100,000 men left. He returned to France to raise new armies, while Russia joined with Prussia and Saxony to withstand his attack. They met, in a victory for Napoleon, May 2, 1813, at Lützen, and Austria was appointed a mediating power to effect peace or declare war in case of refusal. Napoleon paid no attention to the ultimatum, so on Aug. 11 he found himself at war, with 400,000 men, with all the powers of Europe. He was terribly defeated at Leipsic between Oct. 14 and 19, and retired to Mainz with only 70,000 men. The allied armies separated and, after the defeat of Blücher four times in four days by Napoleon, they joined forces, marched upon Paris and took it on March 30, 1814. Wellington then came from Portugal and entered French soil. Napoleon offered to abdicate in favor of his son, but this was refused, and he retired unconditionally on April 11, 1814, being given the sovereignty of Elba, a tiny Italian island.

The accession of the Bourbons was unpopular and Napoleon thought he could save France from ruin. So, on March 20, 1815, he again entered Paris at the head of the army. He had, however, become old and sick, and while his conceptions and plans were as brilliant as ever, the execution of the campaign of Waterloo failed. The English under Wellington and the Prussians under Blücher were against him. On the 16th of June he defeated Blücher at Ligny, but failed to follow up the victory. When he turned against Wellington, the Prussians, unknown to him, were in the rear, and this caused the defeat at Waterloo on June 18. He fled to Paris, and finally abdicated, June 22. Finding escape impossible he surrendered on July 15, and was sent a prisoner to St. Helena, where he died of cancer of the stomach on May 5, 1821. See Seeley's *Short Life; Memoirs of Napoleon Bonaparte* by Bourrienne; and the *Correspondence of Napoleon I.* Carlyle's picture in *Heroes*, Emerson's *Napoleon* in *Representative Men* and Channing's *Napoleon* repay reading.

Napoleon III or **Charles Louis Napoleon Bonaparte,** the second French emperor, was born at Paris on April 20, 1808. His father was king of Holland and brother of the first emperor, and his mother was the step-daughter of Napoleon I. He was educated by his mother in exile in Switzerland and at the gymnasium at Augsburg, but until 1836, during his life in Switzerland, he essentially was a student and writer. Nevertheless, the prestige of the institutions of Napoleon I cast some reflected light on Charles Louis, who looked with longing eyes toward the throne of France, then occupied by Louis Philippe. Indeed, he went so far in 1836 as to appear among the military at Strassburg and endeavor to win them, but he failed, and was taken and brought to the United States without trial. He, however, again returned to Switzerland, of which government France demanded his expulsion, but it was refused. To avert trouble he went to England, and in 1840 made his second attempt to gain the throne by landing at Boulogne, but was this time taken prisoner and sentenced to imprisonment for life at the fortress of Ham. Here he remained, writing many books and editing the French *Dictionaire de la Conversation*, until he made his escape to Belgium, May 25, 1846. Immediately upon the success of the workingmen in the Revolution of 1848 he returned to France and was elected to the constituent assembly from Paris and three other districts, but resigned his seat two days after taking it and left France. In September, 1848, he was recalled by his election from five districts and immediately began the canvass for the election to the presidency, which he received by an overwhelming vote. For a while he lived up to his oath of allegiance to the republic, but only as a cloak to place the military under control of his friends and lay plans for the revival of the empire. On Dec. 2, 1851, by force of arms he routed the national assembly and in that month was re-elected for ten years, only to assume the imperial title within a year. The empire being now established, he broke up the political parties, courted the clergy, and adopted a showy foreign policy. This led to the Crimean War and the difficulty with Austria in Lombardy. Though in these operations he enjoyed the support of Great Britain, his relations to Prussia were affected by jealousies which finally led to the Franco-Prussian War, which proved the end of Napoleon's power. He surrendered in September, 1870, and was held a prisoner until the declaration of peace, after which he joined the empress at Chiselhurst, near London, where he died on Jan. 9, 1873. In 1865 he had published a *History of Julius Cæsar*, which was never finished. See Blanchard Jerrold's *Life of Napoleon III* and *Napoleon the Little* by Hugo.

Narcis'sus, genus of flowering plants with bulbous, perennial roots; leaves and flower-stalks annual. The name is from a Greek word meaning torpor, and has reference to the narcotic properties of the plants. There are several species, among them daffodils and jonquils. The narcissus is widely distributed in the Old World, being found in southern Europe, northern Africa, Persia, China and Japan. The flower was beloved of the ancients, has been celebrated by the poets, and formed the basis of many a myth and legend. *Narcissus poeticus* is celebrated in Greek and Roman verse; *pseudo narcissus* is the common English daffodil; *Narcissus polyanthus* is the parent of the cultivated variety, grown extensively by florists and treasured as a garden-flower.

Narcotics (*när-kŏt'ĭks*). See Poisons.

Narragansett (*năr-ȧ-găn'sĕt*) **Bay,** an inlet of the Atlantic Ocean which reaches north into Rhode Island. It is about twenty-six miles long, and from three to twelve miles wide. It divides Rhode Island into two unequal parts, of which the western part is much the larger. The bay contains several islands, of which Aquidneck and Prudence are the largest. The Pawtuxet and Pawtucket rivers empty into it. At the head of the bay is situated the city of Providence.

Narragansetts, a tribe of North American Indians belonging to the great Algonquin family. When New England was settled, they lived on the shores of Narragansett Bay, in what is now Rhode Island. They numbered 7,000 or 8,000, but were more civilized and less warlike than others of the New England tribes. In 1621 Canonicus, their sachem, sent a bundle of arrows tied with snakeskin to Plymouth, signifying hostility. Governor Bradford changed their purpose by promptly returning the skin filled with bullets and powder. Roger Williams went to them when exiled from Massachusetts, and had influence in their councils, persuading them to peace in 1636, when they again were hostile to the whites. In King Philip's War, more than thirty years afterward, they were believed to be aiding the enemy, and the English, with the Mohegans and Pequots, burned their fort. They retaliated and in consequence a large force was sent to punish the hostile Narragansetts, and they were nearly exterminated. The few who remained became civilized, lived in peace with the whites and lost their native language. There are now only about 150 Narragansetts.

Narses (*när'sēz*), a Byzantine statesman and general, one of the supports of the eastern Roman empire, was born in Persian Armenia about 472 A. D. From a low position he rose to be keeper of the privy purse to Emperor Justinian. Some years later he was given sole command in Italy. His conduct of this campaign was very masterly; having no transports, he marched his army around the Adriatic, encountered the Ostrogoths at Taginæ in 552 and defeated them, slaying their king. After further successes he took possession of Rome, and completely destroyed the Gothic power. Narses was made prefect of Italy in 554 and held court at Ravenna until the death of Justinian, when, being accused of avarice and extortion by the people, he was removed by Justin in 567. Narses died at Rome about 573 A. D.

Narvaez (*när-vä'āth*), **Pánfilo de,** a Spanish adventurer and soldier, was born at Valladolid about 1478. He was the principal lieutenant of Velasquez in his conquest of Cuba, and was sent by him at the head of a force of 900 men to conquer and supersede Cortez in Mexico. He landed at Vera Cruz in April, 1520, and on May 28 was surprised and taken prisoner by his abler and more active fellow-countryman. He was well-treated by Cortez, however, and soon released. He returned to Spain, and in 1526 obtained from Charles V a grant of Florida, over which he was made governor. He sailed the following year with five ships and about 600 men, and landed probably near Tampa Bay in April, 1528. He marched inland, but, after losing half his men in encounters with the Indians, was obliged to return to the coast. Unable to find his ships he built some rude boats in which the much reduced company sailed for Mexico in September, 1528. The vessel which carried Narvaez was driven to sea by a storm and he and his men perished near the mouth of the Mississippi. The only survivors were Cabeza de Vaca, his lieutenant, and three men, who reached land and made their way across Texas to the Gulf of California, reaching Mexico only after years of wandering.

Nashua (*năsh'ŭ-ȧ*), a city and the seat of Hillsboro County, New Hampshire, is situated at the junction of the Merrimac and Nashua Rivers, about forty miles from Boston, and seventeen miles south of Manchester. It is near the center of New England, which makes it a natural shipping point. The city possesses parks and public playgrounds occupying more than 200 acres. Among the prominent buildings are the Federal Building, Nashua Sanitarium, Hunt Home, the United States Fish Hatchery, the Court House, Memorial Hospital and the Church of Saint Frances Xavier. By means of a three-mile canal, the falls of the Nashua River furnish power to the factories of the city. The principal manufactures are cotton cloth, machine tools, refrigerators, ice cream freezers, steam engines, asbestos products, furniture, boxes, iron and steel products, cards, glazed paper, shoes and hardware. Nashua was settled in 1665. It was first incorporated as the township of Dunstable in 1673, by Massachusetts. In 1746 it was incorporated by New Hampshire. It did not receive the name of Nashua until 1836. In 1853 it was granted a city charter. The population in 1930 was 31,463.

Nashville, the seat of Davidson County and the capital of Tennessee, is situated on the Cumberland River, in the heart of the great central Tennessee Basin. The city extends over an area of about eighteen square miles. It is one of the principal railroad centers of the United States, and also has excellent river transportation service. The city has beautiful residential sections, and no tenement district whatever to mar its beauty. Its park districts extend over an area of 469 acres, which includes the Centennial Park. This park is located in the central residence section and contains a replica of the Parthenon. Ten miles east of the city stands "The Hermitage," the home of Andrew Jackson, which has been carefully preserved exactly as it was in his lifetime. To the north is the National Cemetery, the resting-place of more than 13,000 of the heroes who fell in the Battle of Nashville. Among the notable buildings are the State Capitol, the United States Government Building, the Tennessee State Memorial Building and many beautiful churches. Nashville is an important educational center. It is the seat of Vanderbilt University; Peabody College for Teachers; Ward-Belmont College; Southern College; Boscobel College; Buford College, and St. Cecelia Academy. Among the higher institutions of learning for Negroes are Fisk University; Meharry Medical College; Roger Williams University; Walden University; the State Agricultural College, and the Industrial Normal School.

Nashville is one of the largest manufacturing points of the South. It is one of the largest hardwood-flooring markets in the United States. Ninety per cent of the coffee cans used in the South are manufactured in this city. More pig iron for stoves is melted in Nashville than in any other southern city of the country. An unusually large quantity of wheat is ground here. Many religious periodicals are published in this old southern city. These claims reveal something of the variety and extent of industry in Nashville. In 1929 there were 263 industrial establishments employing 14,982 wage-earners who produced goods valued at $108,939,314. The principal manufactures include shoes, stoves, roasted coffees, cement, fibre silk, rayon, meat packing, printing, stock food, paper boxes, planing mills, furniture, hardwood flooring, paint, hosiery, structural steel, and brick.

In 1780 a settlement called Nashborough was made on the site of Nashville by a few settlers from North Carolina. This little village was incorporated as Nashville in 1784, and chartered as a city in 1806. The State Legislature was established at Nashville from 1812 to 1815, and from 1826 to 1843. In the latter year, Nashville became the State capital. The Federal Army occupied the city in 1862. In December, 1864, General Thomas defeated the Confederates under General Hood at Nashville. In 1906, nine square miles of territory were added to the area of the city. The population according to the census of 1930 was 153,866.

See NASHVILLE, BATTLE OF.

Nashville, Battle of, a famous battle of the American Civil War, fought south of Nashville, Tennessee, in 1864. When General Sherman started on his march to the sea, he sent General Thomas to Nashville, to prepare to resist the Confederate army under Hood, who, after withdrawing from Atlanta, was moving on that point. To meet Hood's army, which had contested the possession of Atlanta with Sherman's entire army, Thomas was provided with an entirely inadequate force, consisting in part of a mass of 12,000 new troops and a body of quartermaster's employés. To gain time for organization, Thomas sent Schofield to delay Hood, resulting in the stubbornly contested battle of Franklin. Hood finally established his lines before Nashville on December second, 1864, and on December fifteenth and sixteenth, the battle was fought. It resulted in the rout of the Confederate army, with a loss of 13,500 prisoners and seventy-two guns. The remnant of Hood's army crossed the Tennessee and did not appear again as an army during the war.

Nasik (*nä'sĭk*), a city and the capital of a district of the same name in Bombay, British India, is situated on the Godavari River, eighty-nine miles northwest of Ahmadnagar. It is one of the most sacred places of the Hindus, as it is located on the holy river of Godavari. Pilgrims flock to the town annually, and the river banks are lined with picturesque shrines and temples. Near Nasik are the Lena Caves, numbering twenty-three, which contain rude carvings of Buddha. Formerly, the city was a Mahratta capital, and there are remains of the elegance of that period. Manufactures include paper; cotton, and brass and copper ware, especially caskets, lamps and idols. The district produces wheat, millet, pulse, rice, oil seeds and cotton. The population of the city of Nasik is approximately 33,500; of the district, 820,000.

Nasmyth (*nā'smĭth*), **James,** a Scottish engineer and the inventor of the steam hammer, was born at Edinburgh, on August 19, 1808. He early showed an inclination for mechanics. At the age of seventeen, he built a small working engine for crushing, and made five models of a condensing engine and a road locomotive. In 1839 he had to turn out a large wrought-iron paddle-shaft, and invented the steam hammer to do the work, but it was not perfected until 1842. He patented his invention, and it was adopted by the government in 1843. In 1856 he retired. Nasmyth died at London on May 7, 1890.

Nasriya (*näs-rē'yȧ*), a town of Irak, is situated on the Lower Euphrates River, at its junction with the Shatt-el-Hai. Nasriya is the former capital of the Mustafik tribe, and remains the administrative headquarters. During the World War, Nasriya became famous because of the battle there in July, 1915. The Turkish soldiers occupied the town and had established themselves in front of it. The British troops advanced from Kurna through flooded marshlands, with the temperature registering 113 degrees in the shade. The march, for the most part, was made either by wading breast-high waters literally sown with mines, or on rafts. The British reached Nasriya, however, and with the aid of naval guns on the Euphrates, drove the Turks into the town after stubborn resistance. During the night, the Turkish forces evacuated Nasriya, and the British troops occupied it on the following day. They were in command of Major-General A. F. Gorringe, a cousin of the United States Naval Commander who brought Cleopatra's Needle to New York City from Egypt.

Nassau (*năs'ô*), a city and the capital of the Bahama Islands, British West Indies, is situated on the northern coast of the Island of New Providence. It is the chief port of the Bahamas, and has a sheltered harbor due to the presence of Hog Island on the north. Vessels drawing sixteen feet of water can enter. The town is the seat of a bishopric, and has a beautiful Anglican Cathedral. Queen's College and an agricultural experiment station are also located in Nassau. The town is a popular winter resort and watering-place. It has cable connections with Florida. Nassau carries on an extensive trade in salt, fruit, cotton, sponges, shells and pearls. It was founded by the English in the seventeenth century. The population is approximately 12,000.

Nast (*nȧst*), **Thomas,** an American illustrator and caricaturist, was born in 1840 at Landau, Bavaria. He was brought to the United States in 1846. At the age of fourteen he studied drawing for six months with an instructor, and a year later was employed as draughtsman on Frank Leslie's *Illustrated Newspaper.* Five years later, as special artist of this periodical, he was sent to England, and went thence to Italy, sketching the campaigns of Garibaldi for the illustrated papers of New York, Paris, and London. In 1861 he returned to New York and began his war sketches and political cartoons for *Harper's Weekly* which were immensely popular. Lincoln called him "our best recruiting-sergeant" because of his influence on the North. In 1871-3 his caricatures of Tammany, which he was the first to depict as a tiger, and of Tweed, contributed largely to the redemption of New York City from ring-rule. His modernized Shakespearean scenes are also famous. Later he delivered lectures and illustrated several books. He was appointed United States consul-general at Guayaquil, Ecuador, in 1902, where he died on December 7 of that year, of yellow fever.

Nast, in addition to his periodical work, illustrated several books including Dickens' *Pickwick Papers; Pictures of Italy; The Tribute Book*, and Nasby's *Swingin' Round the Cirkle.*

Nasturtium (*năs-tûr'shŭm* or *năs-tûr'shĭ-ŭm*), a branching, climbing or creeping herb, which is native to Europe and temperate Asia and naturalized in America and elsewhere. It is extensively cultivated. There are about twenty different species known by such names as water-cress and Indian-cress or lark's heel. The latter has a brilliant flower varying in color from orange to scarlet and crimson. The herbs are smooth, with climbing stems and peltate leaves which are used in salads and pickles, as are the seeds and flower buds. The taste of the pungent juice causes one to make a wry face, which accounts for the name, meaning to twist or torture the nose.

Natal (*nȧ-täl'*), a British colony in the Union of South Africa, is situated on the south-eastern coast of Africa. It is bounded by Mozambique and Transvaal on the north, by Orange Free State and Basutoland on the west, the Cape of Good Hope on the south and the Atlantic Ocean on the east. It extends over an area of 35,284 square miles. Natal was discovered by Vasco da Gama on Christmas Day in 1497. The country was peopled by ninety-four native tribes. Tshaka, a chief of the Amazulu, ruled the country from 1805 to 1828, when he was killed and his brother, Dingaan, placed on the throne by a political faction. Then the Boers, who had left Cape Colony to escape English rule, began a series of struggles with the natives, and in 1838, when a commission of Boers was murdered by Dingaan, a large body entered Natal to avenge the murder. The Dingaan faction was opposed by the followers of his brother Umpande, and with these the Boers united, attacking and murdering Dingaan. Umpande then succeeded to the rule, recognizing the Boers as lords of Natal. In December, 1838, Sir George Napier, Governor of Cape Colony, was sent to take possession of the territory. His Highlanders were compelled almost immediately, however, to go to the Cape on account of disturbances there, whereupon the Boers hoisted the flag of the Republic of Natalia. Later two English men-of-war forced a landing at Durban, and after a short struggle drove the Boers back to their capital. Peace negotiations were then concluded, and the larger portion became subjects of the British crown. Some, however, crossed the mountains and entered what now is the Transvaal colony. Natal was formally annexed to the British Dominions in 1843, and in 1844 became a part of the Cape of Good Hope. In 1856 it was declared a separate colony, and was granted an independent government. Before 1860 a great part of its soil was held by immigrants from England. In 1875 there was great dissatisfaction on account of the English rule, and Sir Garnet (now Lord Wolseley) was sent to adjust matters. He was succeeded as governor by Sir Henry Bulwer. During his administration the fear of the strength of the neighboring Zulus under Cetewayo became so great, that Sir Bartle Frére, high commissioner of South Africa, against the protests of colonists and governor, sent a message which precipitated the Zulu war. There followed a war from the effects of which Natal was long in recovering. The charter was granted to Natal in 1893, and in 1897 Zululand was annexed. The legislative authority resides in the crown, a legislative council and a legislative assembly — the crown being represented by a governor who appoints the ministry and, with their advice, the members of the legislative council. The capital is Pietermaritzburg, situated inland about 50 miles northwest of Durban, the chief and almost only seaport. The colony (including Zululand) has an area of 35,371 square miles, with a seaboard of about 400 miles. The population of Natal is 1,191,958, of whom 1,000,000 are Kafirs, the remainder being Europeans and Indians. The population of the capital is about 33,000 and of Durban about 75,000. Natal's products include sugar, maize, wheat, oats and other cereals and green crops — the chief exports being wool, hides, skins, coal, gold bark, unrefined sugar and Angora hair. The principal imports are fabrics, wearing-apparel, grain, ironware and railway material. There are railways of about 1,000 miles to Cape Town, Johannesburg and Pretoria. The coal-fields are known to be extensive, and are in direct communication with the seaport. Portuguese East Africa and Transvaal (separated by the Drakensberg Mountains) border Natal on the north, Orange River Colony and Basutoland on the west and Cape Colony on the southwest. The colony in the main is fertile, and is possessed of a salubrious climate. Winter in South Africa begins in April and ends in September.

As the result of the war between Britain and Transvaal and the Orange Free State, Natal in October, 1899, became at once the theater of strife. See Boer War. Since the war Natal includes the Vryheid and Utrecht districts, formerly a part of Transvaal, with 6,970 square miles.

The railways are operated and all but 50 miles constructed by government, the total outlay being 10,572,962. Cost of construction is quite high owing to the rough character of the country. There are 1,811 miles of telegraph and 134 of telephone governmentally owned and operated. Durban owns its telephone system, with 1,000 connections. There are 361 postoffices and postal agencies, serving 3,892 miles of postal routes. Much remains to be done in the way of educating the natives, missionary rather than governmental effort giving them the few privileges they now enjoy.

Natch'ez, Miss., capital of Adams County, on the Mississippi, in the rich cotton-belt, 90 miles southwest of Jackson and 280 northwest of New Orleans. It is served by the Yazoo and Mississippi Valley, New Orleans and Northeastern and Mississippi Central railroads, and is an important steamboat point. The lower city lies on the banks of the river, but the more important part, including the public buildings, is situated on a bluff above. It is an important cotton market, has cotton mills, factories, machine shops, a meat packing plant, and other industries.

Fort Rosalie was built by the French explorer, Bienville, in 1716 within the present limits of Natchez. Although two hundred or more feet above the river the French garrison was surprised and massacred by Natchez Indians in 1729. Population, 15,000.

Natick (*nā'tĭk*), **Mass.,** a town in Middlesex County, on Charles River, 17 miles from Boston. Its most important manufactures are boots, shoes, men's clothing, shirts, boxes, edged tools, baseballs and supplies for athletic games. Its noteworthy institutions are Bacon Public Library, Morse Institute and Walnut Hill High School for young women. The place was founded by John Eliot as a home for converted Indians, and from 1651 until the founder's death was used as such. It was incorporated as a town in 1781. Natick has a monument to John Eliot and a soldiers' monument, with the service of the Boston and Albany Railroad. Population 11,000.

National Banks. See Banks.

Na'tional Debt is the debt of a nation or government contracted by their legislative representatives. In early times these were comparatively small, because the government, as well as the individual, had to give security for the indebtedness; but since the commencement of the present system of banking and the ability of governments to issue interest-bearing evidences of indebtedness in the shape of bonds, the national debts have in many cases, as that of France, become quite enormous. Regarding the origin of these vast obligations, the most prolific cause is the wars in which the different nations have from time to time engaged. Thus the Civil War added about $2,500,000,000 to the national debt of the United States. Of late, however, the governments have borrowed money for different public purposes, as building railroads and telegraph lines and equipping armies and navies. The present system of securing the national debt is by the issue of bonds, bearing a stated rate of interest, payable quarterly, and maturing or becoming due at a certain date. The debt of the United States is in part secured in this way and in part by the issue by the government of greenbacks or paper currency, actually nothing more or less than promissory notes, due upon demand, at presentation at the United States treasury. The method adopted in the United States for the payment of the debt is by the taxation of spirits, whiskey, tobacco and butterine, by charging certain amounts for the traffic in these articles and by the levy of a tax or tariff on articles imported into the country.

The European War (*q. v.*) not only increased the debts of the belligerents enormously but greatly added to the debts of neutrals, owing to the disturbance of general business conditions, the loss of revenue from the interruption of transportation both on land and sea and the destruction of ships and cargoes by the German submarines. In the case of European neutrals there was also the increased expense of army maintenance. Since 1930, every nation but Finland has defaulted on war debt payments to the United States, and the question of cancellation has been sharply argued.

National Educational Association. This important body was organized as the outcome of a convention of teachers in Philadelphia in August, 1857. It declared its object to be "to elevate the character and advance the interests of the profession of teaching, and to promote the cause of popular education in the United States." The association holds yearly national conventions at different centers. In 1866 women were admitted to full membership. In 1870, when the title was changed from National Association to National Educational Association, began the policy of organizing different departments for the purpose of giving special attention to problems which chiefly interest given classes of teachers. In this way were organized the department of normal schools, the department of school-superintendents, both of which had previously existed as independent societies meeting by consent with the association, with the new department of elementary education and of higher education. The N. E. A. has held regular annual meetings except in 1861, 1862, 1867, 1878, 1893 and 1906. Its proceedings form a valuable storehouse of expert opinion and scientific research upon miscellaneous educational topics and problems. For many years, nevertheless, the membership was low; but in 1884 the enrollment reached 2,729. A permanent fund was inaugurated, now amounting to a very considerable sum. In 1886 the Association was incorporated for twenty years at Washington, D. C., and in February, 1906, it was re-incorporated by an Act of Congress. The N. E. A. may be regarded as an organized attempt at social participation in the task of distributing to each the accumulated experience of all. In 1895 a permanent active membership was created, which now numbers many thousand, and in 1898 provision was made for a permanent and salaried secretary, to give his whole time to the Association. In its jubilee year in 1907, which the N. E. A. celebrated at Los Angeles, California, it was decided to publish separately an index supplement to the *Proceedings* from 1857. They are rich in valuable material.

National Forests. See FOREST RESERVES; FOREST SERVICE.

National Industrial Recovery Act, the "NRA," an extensive piece of legislation enacted under the New Deal instituted by Franklin Delano Roosevelt, which provides national planning for industry. The bill was approved by President Roosevelt on June 16, 1933. The Act was primarily an emergency measure aimed directly at reconstructing the economic order of the country and delivering industry of the nation from the financial chaos into which it had been precipitated by the banking crisis. The President declared the legislation to be representative of "a supreme effort to stabilize for all time the many factors which make for the prosperity of the nations and the preservation of the American standard of living." The Act is divided into three main parts dealing with the process of codifying industry, an emergency public works program, and the administration of direct federal relief to the needy unemployed. Most important provisions of the NRA are:

"1. The President of the United States is empowered to establish machinery for an extensive co-operative movement throughout all industry in an effort to create wide re-employment, shorten the work-week, pay a decent wage for the shorter week, prevent unfair competition and disastrous overproduction.

2. The suspension of anti-trust laws is authorized.

3. The provision for the drafting of new codes of fair competition. The President is granted the right to license business enterprises in unusual cases of non-coöperation and abuse.

4. The recognition of the right of labor to collective bargaining."

This new reconstruction program for industry was enacted for a two-year period. The Administrator of the NRA, General Hugh S. Johnson, was responsible for the originating, drafting, and managing of the Selective Draft Act of 1917-18. An Industrial Recovery Board was created which is composed of the Secretary of Commerce, Daniel C. Roper; the Attorney-General, Homer S. Cummings; the Secretary of the Interior, Harold L. Ickes; the Director of the Budget, Lewis W. Douglas, and the Chairman of the Federal Trade Commission, Charles H. March. The National Recovery Administration is abetted by an Industrial Advisory Board and a Labor Advisory Board, composed of the leaders in the several fields of industry.

The National Labor Board, "NLB," acts in the capacity of a court to settle controversies which develop from varied interpretations of the code. It is a final court of appeals. Robert F. Wagner is chairman of the Board. No binding rules of procedure envelop the court's action. Its agents investigate disputes, act as conciliators, control and manage labor plebiscites, render decisions and attend to the enforcement of those decisions.

Shortly after the Industrial Recovery Act had been signed by President Roosevelt, the various trade associations held session to frame codes and outline plans for the organization of industry under the new order. The NRA stressed the importance of immediate agreement on the part of industry and warned that compulsion would be restored to should industry fail to act voluntarily. It was only natural that individual codes would require much time and consideration. In an effort to speed up the program of recovery and reconstruction, the NRA issued a Blanket Code which all employers were requested to sign.

Its acceptance, however, by industry was voluntary. Under the terms of the Blanket Code a minimum wage, and hours of a work-week were established and child labor was abolished. A thirty-five hour week and a wage of forty cents per hour were created for industry, while a forty-hour week and a $15.00 per week wage were fixed for office workers. Employers were urged by the President to accept these schedules by September 1, 1933, unless during the intervening months the schedules were supplanted by codes in the various industries. By August 1, more than 700,000 employers had accepted the Blanket Code. The schedules were to remain in force until the close of 1933. The badge of employers co-operation with the NRA was the Blue Eagle. Regional recovery boards were appointed consisting of prominent citizens of the nation.

The immediate effect of the NRA was evidence of a renewed vigor in industry accompanied by an increase in employment at higher wages. Soon individual codes were developed chief among which are the Cotton Textile Industry Code, the Steel Code, the Oil Code, the Theatrical Code, the Retail Code, and the Code of the Bituminous Coal Industry. It was not long, however, until code controversies developed and the Industrial Recovery Act became an object for attack. One of the most important controversies attracting nation-wide attention was that between the Ford Motor Company and the National Recovery Administration. The NRA issued a ruling which in effect declared that the Ford Motor Company was ineligible to bid on government contracts. This action was a result of the Ford Motor Company's refusal to sign the code of the automobile industry. The Ford Motor Company remained insistent in its refusal to effect any legislation which aimed at collective bargaining, and held that it was paying its employés wages equal to those prescribed by the code if not higher, and required work-weeks of those employés as short or shorter than the automobile code demanded. On November 11, Comptroller McCarl, whose decisions are final, declared that the Ford Motor Company was eligible to bid and receive government contracts despite its refusal to sign the code. His ruling was based upon the principle that the Ford companies could be declared ineligible only if proof of violation of the code was manifest. He declared that although provisions of the code are held binding on all members of the automobile industry, no organization is compelled to sign it. Should the code become effective, however, "it becomes the law for the industry and is binding on those members who took no part in its formation as well as on those who did participate in its formation and assented to its provisions." The code for the automobile industry had, up to March, 1934, been successful in preventing the unionization of its employés and engaging in collective bargaining.

On March 5, 1934, a series of conferences of the NRA code authorities were opened in Washington to discuss the many problems which had developed during the months in which the NRA had attempted to codify American industry. President Roosevelt addressed the session in which more than 4,000 representatives of industry, labor, and consumer, were present. He declared that "the National Recovery Act was drawn with the greatest good of the greatest number in mind. Its aim was to increase the buying power of wage-earners and farmers, in order that industry, labor and the public might benefit through building up the market for farm and factory goods." The assembly for March 5, had been preceded by a series of gatherings, which were begun on February 27, in which constructive criticism, not baseless opposition to details, was warranted. One of the most outstanding charges made against the NRA was that its administration was encouraging the growth of monopolies. At the opening of the Washington conferences General Hugh S. Johnson presented a twelve-point program which, although vague, advocated (1) uniform government representation on code authorities; (2) protection against the growth of monopoly power; (3) uniformity of both hours and wages in competitive industries; (4) higher wages and shorter work-weeks; (5) a more equitable price stabilization; (6) an effective program for dealing with labor disputes, and (7) an adequate representation of both labor and consumer, as an advisory body, on code authorities.

The Washington NRA conferences have become historic and significant for the many notable statements which were forthcoming throughout the sessions. One of the most significant statements was issued by President Roosevelt when he declared that although the National Industrial Recovery Act was enacted primarily as an emergency measure it "must be permanent for all the rest of our lives." The NRA Consumers Advisory Board declared that "NRA efforts to increase purchasing power have been largely nullified by an excessive price increase." One of the greatest and insoluble problems confronting the NRA has been the task of maintaining higher wages while attempting to keep prices at a level low enough to stimulate consumption.

Another significant statement uttered during the conferences was that made by General Johnson in which he declared that there is no law against a company union "if the men freely choose it. Ninety-nine times out of one hundred, however, you and I know that this is not the case. Let's not kid ourselves."

It has become quite evident throughout the nation that the program of the National Recovery Administration has reached a crisis, the outcome of which will greatly influence its future activity. Out of the Washington conferences arose separate committees appointed by General Johnson which were representative of consumers' goods and capital goods industries. The Administration's demands for concessions from industry towards higher wages and shorter work-weeks met with favorable response despite many utterances of protest. Metal, glass, pottery, fire brick, and confectionery industries responded with a reduction from a forty to a thirty-six-hour week and a commensurate wage increase. Undoubtedly the most important response was that of the National Automobile Chamber of Commerce which announced a work-week reduction from forty to thirty-six-hours and a corresponding wage increase. The National Automobile Chamber of Commerce is representative of all important automobile manufacturers with the exception of Henry Ford. Henry Ford announced the return to a $5-a-day minimum wage for all employés of the Ford Motor Company. At about this same time disputes in automobile factories came to the fore demanding the consideration of the National Labor Board in Washington.

The dispute in the automobile industry became a dangerous and difficult problem in the field of collective bargaining. It was a conflict between the American Federation of Labor and its program of unionization, and the "company unions." Prominent employers throughout the country expressed their determination to prevent the unionization of their employés. An automobile strike was threatening. The most important points in dispute were (1) the demand of the American Federation of Labor unions for a recognition for collective bargaining; (2) their further demand that discharged union men be restored to their positions and that all discrimination against union workers be ended; (3) a twenty per cent increase in wages; (4) the demands of the American Federation of Labor for elections to select the spokesmen in collective bargaining. Against this program of the unions, employers of the automobile industry remained insistent in their refusal to accept unionization and stoutly denied having discriminated against union workers. They planned a ten per cent wage increase and requested that lists of union members be submitted to them as evidence before any bargaining with union leaders is engaged in.

General Johnson summoned a conference of leaders of the automobile industry after the American Federation of Labor had issued a strike ultimatum. The conference met in New York and was called for the purpose of discussing the union demands and averting an automobile workers' strike. It was evident that the American Federation of Labor expected General Johnson to force automobile manufacturers to recognize the American Federation of Labor as a collective bargaining agency. The distinguished NRA administration offered two proposals to the conference:

(1) Elections in all plants to determine the relative strength of both the American Federation of Labor and "company unions."

(2) The establishment of an impartial grievance board in Detroit to judge the conflict between employer and the American Federation of Labor to organize the workers.

The Administrator sought to avert actual strikes and outbreaks of violence by means of the 'trial by ballot,' which is offered as a compromise in each case. Had peace plans failed, Union leaders were ready to call a strike. It was expected that out of the conferences would emerge far-reaching decisions concerning unionization. Many charges have been made against the American Federation of Labor that it has been attempting to use the NRA as a prop for gaining a union foothold in the "open shop" of the automobile industry. The threatened strike which would have affected more than 250,000 workers was settled on March 25. Under the principles involved in the settlement

"(1) Employers agree to bargain collectively with the freely chosen representatives of groups and not to discriminate in any way against any employé on the ground of his union labor affiliations.

"(2) If there be more than one group, each bargaining committee shall have total membership pro rata to the number of men each member represents.

"(3) NRA was to set up within twenty-four hours a board, responsible to the President of the United States, to sit in Detroit to pass on all questions of representation, discharge and discrimination. Decision of the board shall be final and binding on employer and employé.

This board will have access to all pay rolls and to all lists of claimed employé representation, and such board will be composed of (a) a labor representative, (b) an industry representative, and (c) a neutral.

"(4) The government makes it clear that it favors no particular union or particular form of employé organization or representation. The government's only duty is to secure absolute and uninfluenced freedom of choice without coercion, restraint, or intimidation from any source.

"(5) The industry understands that in reduction or increases of forces such human relationships as married men with families shall come first and then seniority, individual skill and efficient service."

President Roosevelt acclaimed the settlement especially noteworthy in that it achieved two outstanding advances. "In the first place we have set forth a basis on which, for the first time in any large industry, a more comprehensive, a more adequate and a more equitable system of industrial relations may be built than ever before. In the second place, for the first time we have written into an industrial settlement a definite rule for the equitable handling of reductions and increases of forces. I would like you to know that in the settlement just reached in the automobile industry we have charted a new course in social engineering in the United States. It is my hope that out of this will come a new realization of the opportunities of capital and labor not only to compose their differences at the conference table and to recognize their respective rights and responsibilities, but also to establish a foundation on which they can co-operate in bettering the human relationships involved in any large industrial enterprise."

In September, 1934, General Johnson resigned as Administrator of the NRA, and the organization was reorganized under three boards with legislative, executive and judicial control.

National Parks, extensive tracts of public land reserved by special Act of Congress from sale or settlement, and maintained by the Government for the recreation of the people. The motive in such reservation has been the preservation in a natural state of unusual scenic beauty, archæological ruins, mineral springs, natural resources or primitive woodland. There are in the United States twenty-three national parks, comprising a total of 13,192 square miles in area. The following is a list of the national parks, the years in which they were created, their location and area in square miles:

ACADIA, 1919, on the Maine coast, twenty square miles, including the granite mountains on Mount Desert Island.

BRYCE CANYON, 1928, in southwestern Utah, fifty-five square miles of canyon scenery, which affords the best known exhibit of vivid natural coloring.

CARLSBAD CAVERNS, 1930, southeastern New Mexico, sixteen square miles of stupendous caverns with unusual limestone formations.

CRATER LAKE, 1902, southwestern Oregon, 251 square miles, including lava formation and an extraordinarily blue lake.

GENERAL GRANT, 1890, middle eastern California, four square miles of Big Trees.

GLACIER, 1910, northwestern Montana, 1,534 square miles of mountain scenery with sixty small glaciers and 250 beautiful glacial-fed lakes.

GRAND CANYON, 1919, north central Arizona, 1,009 square miles affording the finest example of erosion and the most magnificent and colorful spectacle in the world.

GRAND TETON, 1929, northwestern Wyoming, 150 square miles including a part of the Teton Mountains.

GREAT SMOKY MOUNTAIN, 1926, North Carolina and Tennessee, 456 square miles, protected but not developed until at least 427,000 acres shall have been donated, as 297,719 acres only are in possession of the Government.

HAWAII, 1916, Hawaii, 245 square miles, including Kilauea and Mauna Loa, active volcanoes, and Haleakala, a huge extinct volcano.

HOT SPRINGS, 1921, central Arkansas, one and one-half square miles, with forty-seven hot springs.

LASSEN VOLCANIC, 1916, northern California, 163 square miles including the peak and cone, hot springs and mud geysers around a recently active volcano.

MESA VERDE, 1906, southwestern Colorado, eighty square miles comprising the finest and best preserved historic cliff dwellings in the United States.

MORRISTOWN, 1933, New Jersey, one and one-third square miles of territory famed in the Revolution.

MOUNT MCKINLEY, 1917, south central Alaska, 3,030 square miles including the highest mountain in North America.

MOUNT RAINIER, 1899, west central Washington, 378 square miles of magnificent scenery, revealing the largest accessible single peak glacier system, which comprises twenty-eight glaciers, and fields of beautiful sub-alpine flowers.

PLATT, 1902, southern Oklahoma, one and one-third square miles of medicinal springs.

ROCKY MOUNTAIN, 1915, north central Colorado, 405 square miles in the heart of the Rockies.

SEQUOIA, 1890, middle eastern California, 604 acres of huge sequoias in the midst of precipitous mountain scenery.

WIND CAVE, 1903, South Dakota, eighteen square miles of galleried caverns.

YELLOWSTONE, 1872, northwestern Wyoming, southwestern Montana, and northeastern Idaho, 3,438 square miles, which has more geysers than contained in the entire world. This is a vast wildness, one of the greatest wild bird and animal preserves in the world, noted for its petrified forests, mud volcanoes, and the gorgeously colored Grand Canyon of the Yellowstone.

YOSEMITE, 1890, middle eastern California, 1,176 square miles of world-famed beauty including cliffs and waterfalls, and three groves of Big Trees.

ZION, 1919, southwestern Utah, 148 square miles along the beautiful deep gorge of Zion Canyon.

Natural Bridge, The, an arch of limestone which spans a small river in Virginia, one of the features of the landscape in the far-famed Shenandoah valley, is situated west of the Blue Ridge, fourteen miles from Lexington, Virginia. It stands among cascades, caverns and deep pinewoods, a mighty arch of a single stone. It is 215½ feet in height and 100 wide, and has a span of eighty feet.

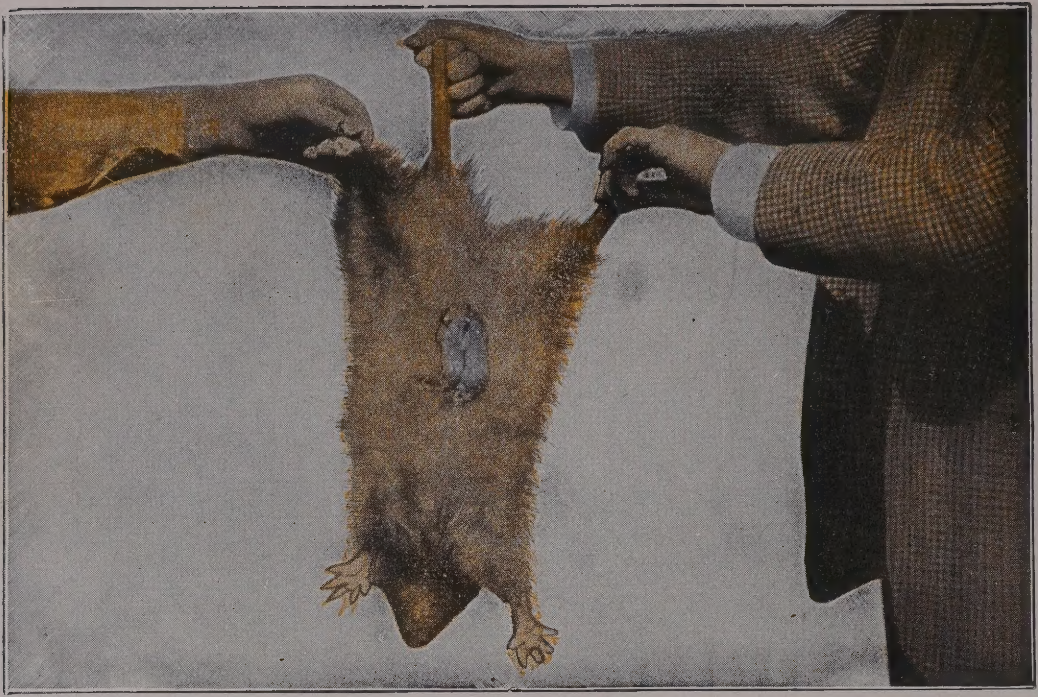
Natural Gas, combustible gas which escapes from beneath the soil in such quantities that it may be used for fuel or illuminating purposes. In its natural state the gas occurs in porous sedimentary rocks, and, when proper openings are made, it rises to the surface. Wells are drilled for gas, as for oil or water. Natural gas is the product of decay or distillation of organic matter buried in sand or mud. By its burial the organic matter is shut off from contact with the air, and hence the gases arising from its deposition and distillation are not completely oxidized. Organic matter is now being imbedded in sands and muds which are in process of deposition on lake and sea bottoms. Under proper conditions this might ultimately give rise to gas. Natural gas is really a mixture of several gases in

SPIDER WATCHING FOR PREY

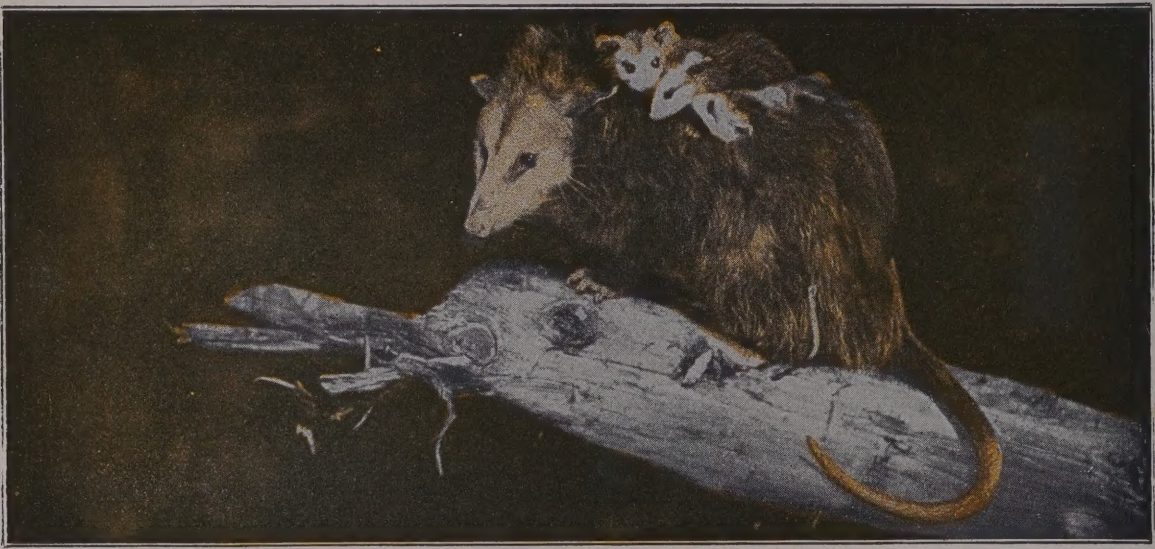
WHITE-FOOTED MOUSE AND YOUNG—By A. R. Dugmore

MR. DUGMORE RAN A MILE TO RESTORE THE MOTHER TO HER CHILDREN, SHE HAVING RUN INTO HIS POCKET WHEN FRIGHTENED, AND BEING FOUND THERE LATER

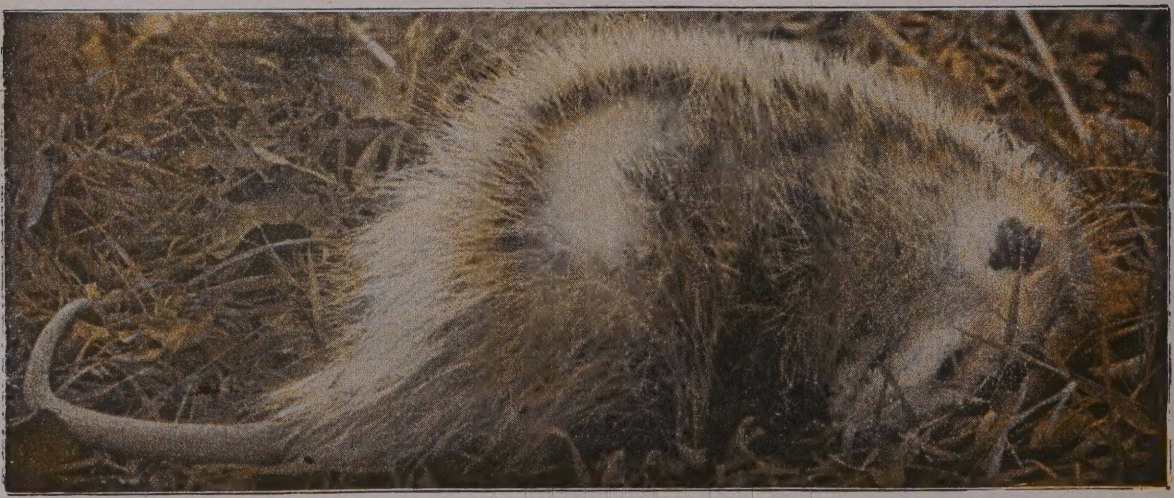
Courtesy of Doubleday, Page & Co.



OPOSSUM, SHOWING YOUNG AT THE MOUTH OF THE POUCH



OPOSSUM, SHOWING YOUNG ON THE MOTHER'S BACK



"PLAYING 'POSSUM." THIS ANIMAL IS ALIVE

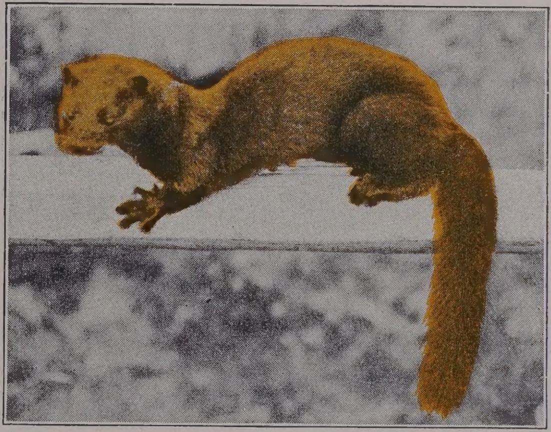
Courtesy of Doubleday, Page & Co.

SKUNK CROSSING A STREAM

CHIPMUNK

RACCOON

SQUIRREL



MINK

RED FOX

COYOTE

OPOSSUM

PRAIRIE DOG

MUSKRAT

GOPHER

WEASEL

WOODCHUCK OR GROUND HOG

MOLE

variable proportions; among them marsh-gas (CH_4) and hydrogen are usually most abundant. Natural gas is widely distributed. It is extensively utilized in Indiana, Pennsylvania, Ohio, West Virginia, New York and California; to a limited but still important extent in Kansas and Kentucky; and to a slight extent in Utah, Colorado, Illinois, Missouri and Texas. The flow of gas from a well usually is of short duration. It may last for a few months or even years, but not indefinitely. The popular notion that the withdrawal of gas from beneath the surface leads to earthquakes is wholly without foundation. The gas occurs in the pores of rock, and its escape does not make the rock less firm or substantial. Gas occurs in rock formations of various ages. Some of it comes from rocks as old as the ordovician (see GEOLOGY), and some of it from formations as young as the tertiary or even pleistocene. Natural gas and petroleum are probably associated in origin, as they often are in their distribution.

Nat'uraliza'tion, the process by which a person born in another country becomes possessed of the privileges and is placed under the obligations of a citizen of the country in which he resides. It involves the renunciation of allegiance to one country and the adoption of the other. It was not until 1870 that Great Britain recognized such a renunciation by any of its subjects, and before that time would charge with treason any person having so done, if he bore arms against Britain; but in that year a treaty was made by which Englishmen who had been naturalized in this country, were treated as citizens of the United States and vice versa. The conditions upon which one can become naturalized differ materially in various countries. In the United States a foreigner must make oath of his intention to become a citizen. If at this time he has resided three years in the United States he receives what are known as his "first papers." Then, after the lapse of two years, upon a sworn substantiation of his good morals, a five years' residence and a renunciation of all allegiance to any and all foreign monarchs or potentates and all titles of nobility, before any one of the superior, district or circuit courts, he becomes a citizen of the United States. In Great Britain five years' residence or service under the crown entitles a foreigner to a certificate of naturalization, procurable from one of the principal secretaries of state. The British colonies make their own rules for becoming a citizen, applicable, however, only to the colony in which they are made. In France a foreigner, after having obtained permission to reside, may receive a certificate of declaration of intention after three years' residence, and by the French naturalization act of 1889 may become naturalized after ten years' residence without any preliminaries. In Germany an applicant must show that the laws of his country allow him to renounce it, that he is residing in Germany, leading a respectable life, and has a means of livelihood; then the higher administrative power issues his papers. In all countries a married woman is considered as subject to the country in which her husband is naturalized, and a father's naturalization carries with it that of his minor children. See *Nationality* by Chief-Justice Cockburn.

Na'ture-Study. The environments of the child constantly stimulate sense perception and provoke inquiry. They are always arousing him to see, hear, smell, taste and touch. The satisfaction he gets in exercising his senses begets increasing desire to their further exercise, and his ability to discriminate grows rapidly every day. Curiosity and wonder spur him to find out what he can about everything he meets. These experiences are his mental food as well as the means of his physical development. Parents usually pay too little regard to mental culture in the first five years of the child's life, little realizing its relation to the after-life, though his eagerness to know usually accumulates a great fund of child knowledge and even child skill before he enters school. These years powerfully affect his life-long habits of investigation, thinking, talking, language and acting.

On entering school he has already made considerable progress in getting acquainted with the animate and inanimate objects about him. He is usually bubbling over with interest in everything he meets, particularly with those things that give sense pleasure and strike him as strange and novel. His knowledge is already of things in nature as well as of things in the household and about his father's work. This knowledge furnishes a fine starting-point for his school work and suggests the wisdom of continuing it on the very lines so well calculated to maintain and enlarge his interests and encourage him to study. Nature study, then, may rightly engross a large part of the course of study for the lower grades. It serves to introduce the elementary work in the other subjects usually included in the higher grades, and thus provides for that gradual transition to their more abstract phases and their more complex problems which is demanded by all scientific method. The teacher should so plan the nature work, that it not only extends the child's range of experiences but anticipates in a logical way the deeper and broader inquiries which he is to make later.

While there should always be method and system on the side of the teacher, there should always be relative simplicity and variety on the side of the child. The material should be selected with a view to the continual exercise and development of the perceptive activities, of observation, of understanding, of memory, of judgment and of language. But the primary purpose should be a development of a genuine love of nature. This should be a very prominent idea in selection throughout the elementary school, at least, and probably higher.

There is abundant material in every locality for use in this study. The teacher's individuality and ingenuity will enable him to utilize the children in gathering the material and the data for talks and studies. In the higher grades the inquiries should be exhaustive and should assume a more strictly scientific form.

In September or October there are many interesting and instructive features of plant life which furnish the material in sufficient variety for several lessons: the more common autumn fruits of the locality, wild and cultivated, with a study of their form, texture, flavor, name and use; the autumn leaves and flowers with a study of their form, color etc.; the autumn seeds, their forms, methods of distribution by winds, by animals, by water. The animal life of these months is full of interest for young and old. The birds which have summered in the locality are going south and others with strange plumage are coming from the north on their way further south or to spend the winter here. Insects are gradually disappearing in a variety of ways, some going into winter quarters to appear in new forms in the spring, others hiding away in the trees, in the earth or elsewhere, while countless multitudes deposit their eggs and die. The thickening of the coats of the wild and domestic animals should be carefully observed now and in the month following. Clouds, rain, dew, frost, changes in temperature, direction of the wind will interest the child every month in the year.

In November and December nature study finds ample outdoor range in discovering how the plants have prepared for winter, how the buds are sealed up, where the leaves have gone, what animals still remain in the locality and how they live, what the streams are doing, where the fish and other water animals have gone, what the farmers are doing. They also are good months for studying further the collections of fruits, seeds, leaves, grasses made in other months. Why are the days so short now? Why is the sun so far south? Why are fruits and vegetables beginning to rise in price in the markets?

The weather is a fruitful theme during January, February and March, but there is much also to engage attention in the lines mentioned for the preceding months. A simple study of the forms and modes of movement of domestic and of wild animals will make a few attractive lessons. These are good months for the study of the various forms of water and for making simple experiments in light, heat, electricity. Note later the signs of springtime in the growing length of the days, in the disappearance of frost and snow, in the swelling and opening of certain kinds of buds, in the flowing of the sap in the trees, in the appearance of an occasional last year's animal, in the song of the robin or the quick cry of the redbird, in the buzzing of venturesome bees, in the work about house and farm.

April, May and June conspire to furnish a world of material to attract and interest childhood. The studies should include the germination of seeds, the unfolding of leaves, the opening of the flowers; the parts of the plant, of the leaves and of the flowers; the various animals that cover the earth and skim the air; the moulting of the birds; the metamorphosis of the grasshopper, the butterfly, the frog; the building of nests; the swarming of the bees; animal foods. They should also include all kinds of work about farm and home and keep the child in close touch with ploughing time and seed time and harvest; with the pests the farmer fears; and with the friends he should protect.

July and August, as well as a great part of June, are months in which the child is usually out of school, but if the teaching during the other months is successful, these months also will have much in experiences upon which he will find pleasure in drawing as school opens in September.

Nature study includes the various parts and functions of the child's body, as well as of animals in general, and should make the child acquainted with the conditions essential to good health and to the development of physical strength and skill. It also includes a study of the topography of the locality, the soil, the rocks, the mineral deposits, the springs and streams, together with the forces which have shaped and are shaping the land. Excursions to other localities will be invaluable in adding zest to every phase of the study.

Success in directing nature study depends greatly upon the teacher's ability to select and arrange these materials in such a way as to bring them within the growing capacity of the child and yet stimulate perpetual effort. All of the foregoing and much more may readily be covered in a simple way in the first three years of a child's school life. The enlargement of the scope of the study in the following years gradually differentiates into geography, botany, physiology, physics, chemistry, meteorology, astronomy, zoology and geology.

Two kinds of work in this field are very desirable: extensive work and intensive work. In the first place, it is desirable that at least one period per week in the elementary school be occupied with brief consideration of the many nature-study objects the children in a class collect here and there and bring to school. A few interesting remarks by the teacher about each of a dozen or more objects on such an occasion can do much to keep children alive to the things about them. In the second place, it is desirable that important topics, as the horse, cow, cat, song-bird or maple-tree, be treated at length. Often in a third or fourth year class one month of these periods per week may be too little time for one such topic. The former is extensive, while the latter is intensive study.

As to method: Mere description or observation should be subordinated to function as a rule. It usually is uninteresting to begin the study of a plant or animal with mere observation or description, and it is unnecessary. It is far better to start off for the solution of some important problem, and in general to study under the influence of problems. For example, if the squirrel is the subject, a class can set out to study how he manages to live through the winter, how he gets food in the summer. The answers to such questions will require much close observation or description, and at the same time preserve more organization among the multitude of facts collected.

A few of the many good books dealing with the facts of nature are the following: *Madam How and Lady Why* by Charles Kingsley; *Sharp Eyes* by Wm. H. Gibson; *Wild Animals I Have Known* by Ernest Seton Thompson; *The First Book of Birds* by Olive Thorne Miller; *Neighbors with Wings and Fins* by James Johonnat; and *Birds and Bees* by John Burroughs. A few of the best helps to teachers are *Nature Study and Life* by C. F. Hodge (the best); *Nature Study* by W. S. Jackman; *Special Method in Elementary Science* and *Nature Study Lessons*, both by McMurry.

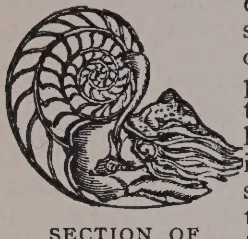
Nature-Study with the Camera. Since the perfection of modern photographic apparatus, — the hand-camera with its quick shutters, rapid dry-plates and films, — the hunting of wild life with a camera has become a fascinating recreation. Even in sporting circles there is a call to substitute the camera for the gun as the sportsman's weapon. *Forest and Stream*, arguing for such a change, says: "Every camera hunter must admit that more immediate and lasting pleasure is afforded in raking a running deer from stem to stern at twenty yards with his 5 x 7 bore camera than in driving an ounce ball through its heart at 100 yards. Then think of the unlimited freedom of this noiseless weapon. No closed season, no restriction in numbers or methods of transportation, no posted land; but you can pull on a swimming deer or an elk floundering in the snow, take a crack at a spotted fawn, bag the bird on its nest or string your cameras out like traps, with a thread across the runway, and gather in the exposed, game-laden plates at nightfall without any scruples about being called a pot-hunter or a game-hog." In introducing a book of wild life illustrated with the camera President Roosevelt wrote: "The older I grow, the less I care to shoot anything but 'varmints.' If we can only get the camera in place of the gun and have the sportsman sunk somewhat in the naturalist and the lover of wild things, the next generation will see an immense change for the better in the life of our woods and waters."

But this use of the camera has proved of distinct value in aid of nature-study, providing the means of gaining a clear and intimate knowledge of wild animals, birds and reptiles, their appearance, their haunts, their habits and all the phases and conditions of their life. Moreover, the young are thus enabled to become direct observers and students of animated nature; for not only have naturalists, as Chapman, and camera-hunters, as Dugmore and Wallihan, brought from the Rockies, from the forests and waters of Canada and from the shores and everglades of Florida the trophies of their skill and patience in a wealth of photographic pictures of every variety of wild animal, running, climbing or feeding, and of birds and wild fowl in flight or at rest, but amateurs, even schoolboys and girls have become expert in securing photographs of the more familiar birds and animals to be found in field and forest accessible to every village and town. With the development of habits of close observation, quick perception and careful analysis required in this delightful pursuit, the love of nature is begotten, and the career of a naturalist is often determined then and there. Teachers who lead their classes to field and wood will find the camera a most interesting and helpful adjunct to these excursions. Stalking a bird, a rabbit, a squirrel or a gopher, while simple and tame to the expert, is to the school boy an experience full of interest. Soon he will come to note in what surroundings the bird or animal is found, what it is doing, if feeding what sort of food it is eating, the place and character of its nest or burrow. The pictures when developed recall these details and fix them in the mind, and the boy thus becomes possessed of a fund of valuable information obtained at first hand. With increased experience these excursions may take wider range. The mature lad will give zest to his vacations by becoming a hunter of wild life with camera and flashlight.

The pictures which follow give suggestions of the thrilling experiences and show the splendid rewards which come to the man who hunts with a camera.

Nau'gatuck, Conn., a town in New Haven County, on Naugatuck River, five miles south of Waterbury and 15 northwest of New Haven. It is served by the New York, New Haven and Hartford Railroad. Its manufactories receive their water-power largely from the river, and include rubber and woolen goods factories, buttons, factories for the manufacture of chemicals, paper boxes and iron and brass foundries. Population 18,000.

Nautilus (*na'tĭ-lŭs*), a mollusk having a chambered shell and belonging to the class *Cephalopoda.* It is the sole living representative of one order of that class, possessing four gills, while the other cephalopods have only two. Its shell is not uncommon on the shores of warm seas, but the animal is not often found inhabiting the shell. It creeps about the bottom, and the floating shell is the result of storms. It is called both pearly nautilus and chambered nautilus. The former name comes from the pearly appearance of the innermost layer of the shell, the latter from the circumstance that the spiral shell is divided into a set of chambers. The animal lives in the outermost one. When very young, it lives in a small shell shaped like a horn. As it grows, it draws the body forward, secretes a pearly partition just back of it, and adds to the margin of the opening of the shell; this is repeated, and a set of chambers results. The animal has a plump body connected with the apex of the shell by a sort of cord, which passes through the center of each partition wall. There are large eyes. The head is surrounded by a number of arms or tentacles, which do not possess suckers like the squid or devilfish, to which the nautilus is related. The paper nautilus or argonaut is sometimes confused with the true nautilus. It, however, belongs to another division of the cephalopods, having only two gills. The shell of this animal is secreted by the female only, as a case or cradle for the eggs, and is not a shell to protect the animal. In geological times there were huge chambered shells inhabited by animals like the nautilus. These shells were straight instead of being coiled, and are well known under the name orthoceratites. See Woodward's *Manual of the Mollusca* and Holmes' poem of *The Chambered Nautilus.*



SECTION OF NAUTILUS

Navajo (*nä'vä-hō*) **Indians,** a tribe of American Indians belonging to the Athabascan or Tinney stock. They call themselves Yutahenne. They occupy a fine reservation in Arizona and New Mexico, and are civilized in a good degree. They carry on farming, though their utensils are mostly hoes and primitive implements, such as sharp sticks. Their leading crops are corn, beans, melons, pumpkins and wheat, and they have orchards of peaches and apricots. Their reserve includes 5,468,160 acres of land. They number about 17,000. While not given to fighting, they have much spirit in defending their rights. There is a school on their reservation, but the Indians do not compel their children to attend it. The houses are rude booths or huts built of sticks, sods or bushes. As they never enter a house where a person has died, when a death occurs, the corpse is buried by pulling out the prop-sticks and letting the sods and sticks fall on it. The Navajos are strong and well-built, and are expert horsemen and herders.

Na'val Acad'emy of the United States, The, a school for the training of naval cadets under the supervision and control of the government, was founded by Federal authority in 1845, Geo. Bancroft the historian, then secretary of the navy, having planned and established it, and opened for the reception of students in October of that year It is at Annapolis, Md., on Severn River, and occupies the site of old Fort Severn. Previous to this date there had been a school for the training of midshipmen in connection with the Naval Asylum at Philadelphia, Pa. Commander Franklin Buchanan was the first superintendent. The institution was reorganized in 1850 and in 1851, important changes taking place at each of these dates. The grounds with the buildings occupy 50 acres, while outside the walls 100 acres additional belong to the park. Two students, known as midshipmen, are allowed for each senator, representative and delegate in Congress; two for the District of Columbia; and five each year from the United States at large; and one from Porto Rico, who must be a native of the island. The midshipmen from the District of Columbia and the country at large are appointed by the president, and the one from Porto Rico upon the recommendation of its governor. Candidates are required to pass an examination (after appointment) as to physical soundness, knowledge of spelling, grammar, geography, history of the United States, arithmetic and algebra as far as equations of the first degree. They must be between 16 and 20 and be unmarried. Midshipmen are allowed an annual honorarium of $500. If admitted, they must make a deposit of $200 to cover the cost of personal outfit; but their expenses of travel from their homes to Annapolis are refunded, and they receive $500 a year, subsistence, clothing and certain other expenses being, however, required of them The course has been changed several times, but, as it now stands, all cadets must pass four years at the academy and two at sea During the first three years cadets are instructed in English studies, history, French, Spanish or German, algebra, geometry, trigonometry, astronomy, physics, chemistry, mechanical drawing and navigation. The studies of the fourth year are varied according to the special line of duty to which the cadet devotes himself, as naval construction, gunnery, infantry tactics, international law etc. The academy has 102 instructors and about 750 students. The library contains 50,000 volumes. The government has recently spent $15,000,000 for improvements at the Naval Academy. These consist of several massive practice-halls, a magnificent memorial chapel, modern living quarters and fine roadways and terraces. The body of John Paul Jones, brought to America from Paris in 1905, is interred in the chapel.

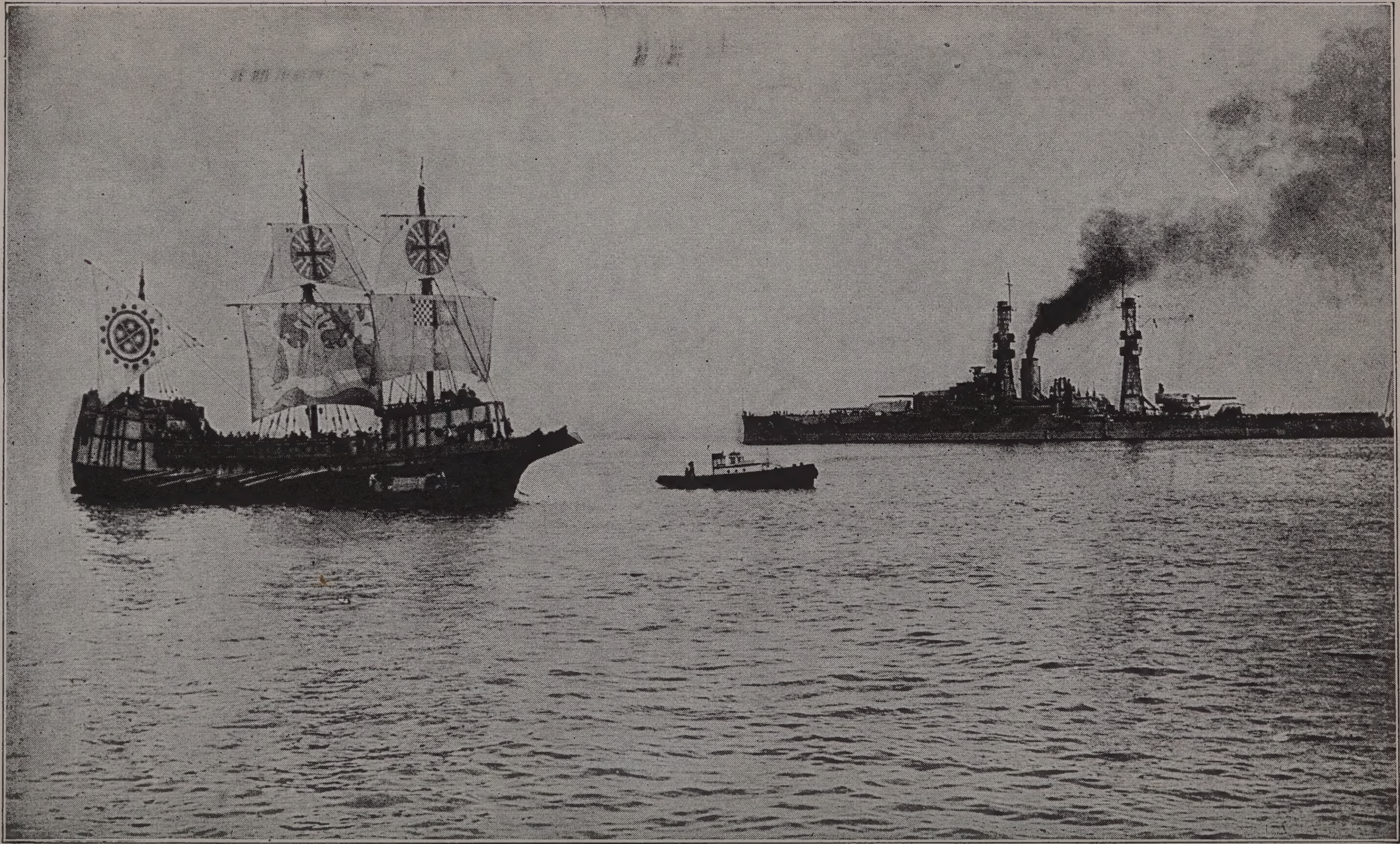
Naval Observ'atory of the United States, The, an institution of the Federal government, is located at Georgetown, District of Columbia, under the superintendence of the bureau of navigation. It was established in 1842, and then called the Depot for Naval Charts and Instruments. The *Nautical Almanac*, issued yearly, is compiled at this place. The present equipment of this observatory is probably surpassed by no other in the world for the performance of the important functions intrusted to it.

Naval Reserve. In all the more important countries, in addition to the regular naval forces serving continuously with the fleet, there are others who are drilled and instructed in order to be able to supplement the regular naval forces in time of war. In times of peace these men are largely employed in the merchant marine, yachts, auxiliary government service, or are pensioners. The reserves of the French, German and Italian navies are derived chiefly from honorably discharged men who have served the required term of enlistment, but others, as fishermen, merchant sailors and those pursuing such other callings as afford experience useful in the war fleet, are employed. The naval reserve force of France numbered in 1906 about 114,000, more than 25,000 of whom were serving with the fleet; and the German naval reserve force numbered 110,000. The Russian naval reserve force is somewhat similarly derived, but contains a greater proportion of untrained men unfamiliar with nautical life. The British naval reserve force is made up of the Royal naval reserve, the Royal fleet reserve and pensioners. The United States has no national naval reserve force, but has what is called a Naval Militia, which in a way answers the same purpose. There have been frequent efforts to secure the necessary legislation for the establishment of a regular naval reserve, and the Naval Militia is the chief result of these efforts. In 1887 a bill was introduced in Congress "to create a naval reserve of auxiliary cruisers, officers and men from the merchant marines of the United States," but it was not passed. In the same year the Navy Department prepared a plan of organization for a naval militia. In May of 1888 the legislature of Massachusetts provided by enactment for the establishment of a naval battalion to be attached to the state volunteer militia. In the same year Pennsylvania and Rhode Island and in June of 1889 New York followed with similar legislation. The Massachusetts naval battalion was drilled on board the receiving ship *Wabash* and the New York battalion on the receiving ship *Minnesota.* Nothing more was done until March 2, 1891, when Congress appropriated $25,000 for arms and equipment of naval militia. A few weeks later California created by legislative enactment a naval battalion, and North Carolina with executive sanction and Texas by order of the governor did likewise. Ten other states and the District of Columbia have since made similar provisions. Now naval militia are organized in 16 states and the District of Columbia with 474 commissioned officers and 5,275 enlisted men, involving an annual expenditure by the national government of about $75,000. All matters relating to the naval militia come under the cognizance of the Assistant Secretary of the Navy, who transacts all business relative thereto through the governors and adjutant-generals of the states.

Navarino (*nä'vå-rē'nō*) (officially **Pylos**), is a town of 2,000 inhabitants on the southwest coast of the Morea, in Greece and the best harbor in Greece. In 425 B. C. the great battle between the Athenians and the Spartans, in which the Spartans were defeated, occurred in the bay; and on October 20, 1827, the combined British, French and Russian fleets annihilated the Turkish and Egyptian navies at the same place

Navarro, Mary A. See ANDERSON, MARY.

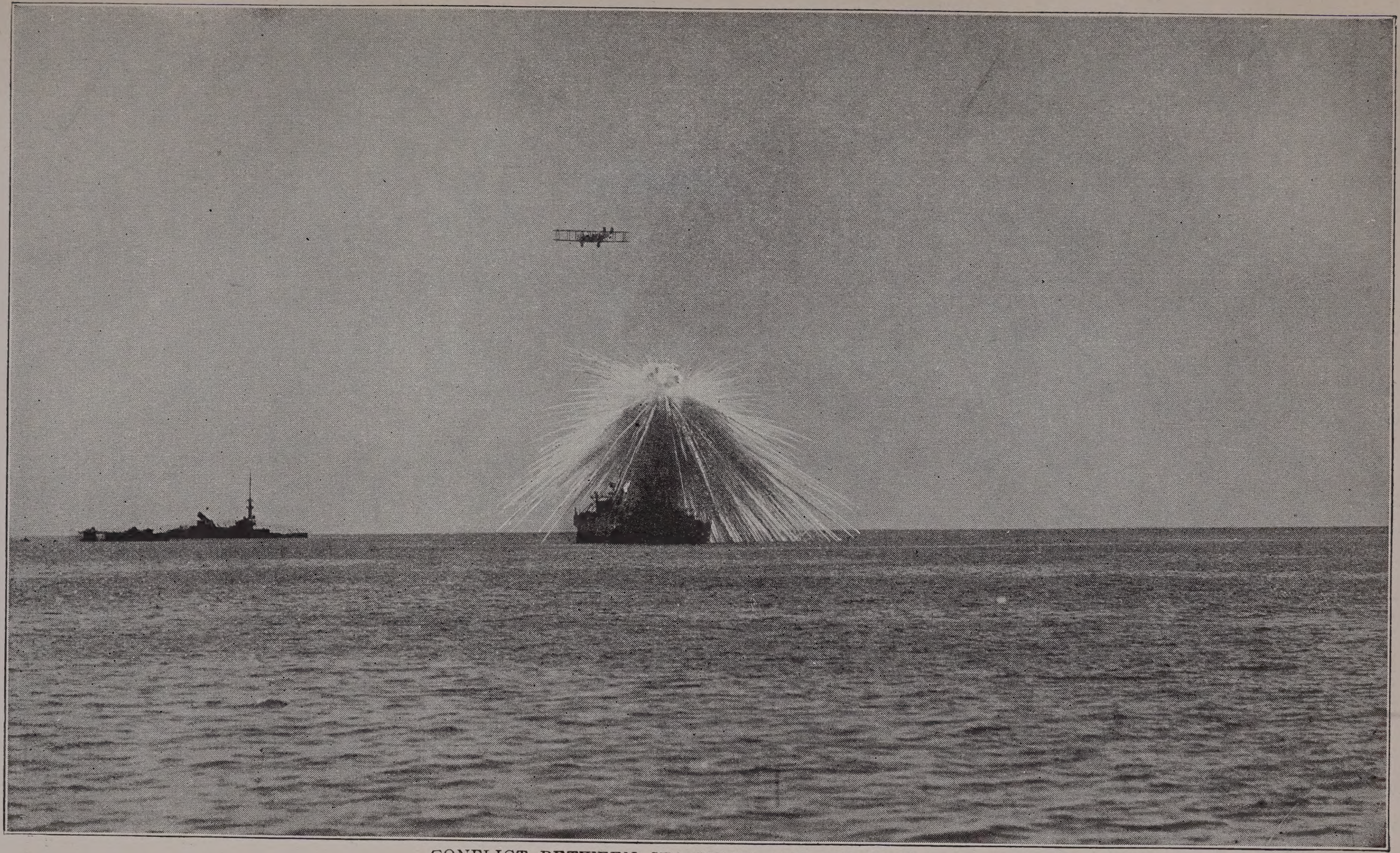
Nav'iga''tion is the art of sailing a ship from port to port. There are two methods of determining the situation of a ship at sea. One consists in finding the latitude and longitude by astronomical observations; the other in noting the ship's direction and the distance traveled each day and in computing by trigonometry the position of the ship In the latter method the two instruments used are the mariner's compass to determine the direction and the log-line to determine the rate of travel. Winds and currents and variations of the compass needle render this method untrustworthy. The most accurate method of determining the position is by astronomical observations Every ship is provided with at least one accurate chronometer. Then, by noting accurately the time when the sun reaches its highest altitude, the true noon is found, and from difference in time as noted from the chronometer the longitude can be calculated. Similarly, the latitude may be calculated by observation with the sextant of the sun's altitude in the heavens at noon. When the sun is obscured at noon, other astronomical methods are resorted to as observations at other



A CONTRAST IN BATTLESHIPS BUILT FOUR CENTURIES APART

International News-Reel Photo.

Four hundred years have made a lot of difference in warships. In this picture a tug is towing a Spanish galleon out to sea past the U. S. S. Oklahoma, one of Uncle Sam's modern dreadnaughts.



CONFLICT BETWEEN SEA-CRAFT AND AIR-CRAFT

Courtesy U. S. Army Air Service

Here is a picture of a large phosphorus bomb exploding as it hit the "Crow's nest"—the tall steel structure rising from the center of United States warships. The bomb was dropped by airplane shown above the vessel, and is an indication of what may happen if there is another war. The use of poisonous gas may become man's deadliest of war weapons.

hours and on other heavenly bodies. No one method is ever relied on solely, but every observation possible is made to check up others. Currents and temperatures of the sea are observed, depths are noted by the lead, and when land is approached lighthouses and lightships are carefully watched for.

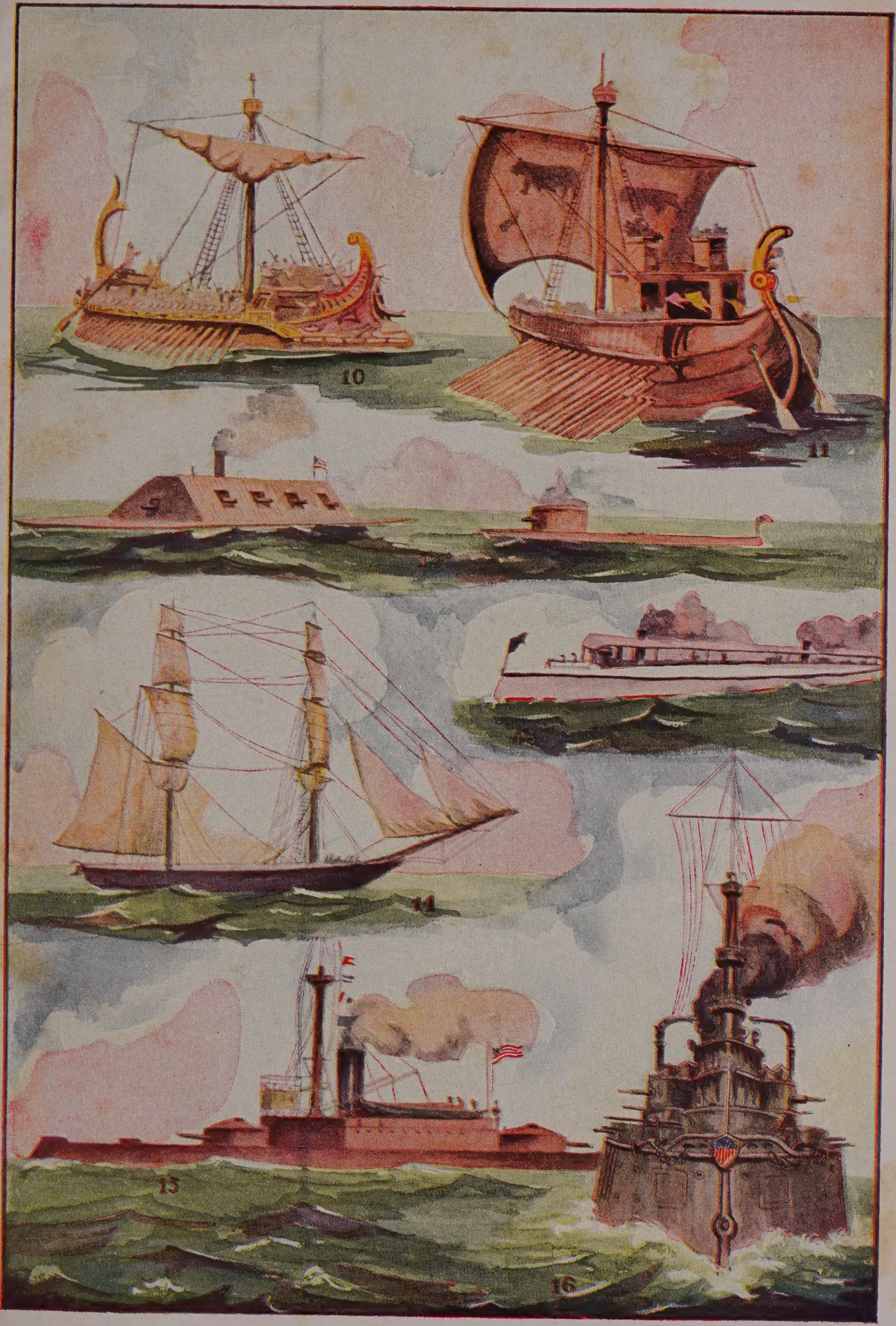
Navigation Laws, such as interfered with American shipping during the colonial period and such as the United States herself laid down for shipping subsequent to the Declaration of Independence, denote a policy of interference in trade, manufactures etc , which received its first serious challenge from the *Wealth of Nations* of Adam Smith. As early as 1381 England had begun her policy of insisting that merchandise to and from the kingdom should be carried only in English ships. This prohibition was not effective. The English parliament, however, enacted a similar law in 1645, which under Charles II was replaced by the Act of 1651, legally known as the first navigation act. The second navigation act (1663) had special reference to colonial trade, which was expected to benefit English shipping only. By this act, therefore, all colonial produce for export must be landed in an English port. Yet there were many evasions of the navigation acts, especially by American shipping. The Spanish navigation laws were even more stringent than the British laws; they were summed up in the policy of treating foreign vessels found in Spanish waters as pirates.

The United States constitution in 1789 included a provision that Congress might make such navigation laws as it pleased. Strict acts, favoring American shipping by imposing tonnage on foreign vessels, were passed in 1789 and 1792. A system of mutual concessions, however, began with England after the war of 1812. England repealed her navigation acts in 1824; and America passed more liberal laws in 1884, so that vessels owned only in part in America may now fly the American flag. Tonnage rates were reduced in the United States in 1886. The act of 1884 established a bureau of navigation, subject to the oversight of the treasury department.

Na'vy. The navy of any county is its fighting force on the sea, and bears the same relation thereto as does the army as a land-force. The ancient method of naval warfare was in great part the practice of driving a beaked vessel against another with great force. This survives to the present day in the use of *rams*. The ancient boats were propelled with force and precision by oars, arranged in one, two or three tiers and manned by either standing or sitting sailors. A three-banked vessel was called a trireme. The Persians, Carthaginians, Phœnicians and Greeks are known to have had such fleets as early as the 7th century B. C.

The modern navy dates from the 16th century, when, in 1588, the English fleet destroyed the Spanish Armada, and by slow steps in conquering the French and Dutch became the foremost maritime power of the world. The first naval ship to be protected by iron was launched at Toulon in 1859 and named *La Gloire*. From this were patterned the subsequent armor-clad vessels, with improvements from time to time. The construction of the American navy dates from the war of independence, and in 1812 and 1814 it proved a worthy foe of England on the seas. Thereafter it was in a measure neglected until the Civil War, when the construction of the armored *Monitor* changed the type of the warships of the future, transforming the whole idea of a navy. In place of the old wooden vessels it is composed of powerful steel steamers, capable of high speed and mounted with batteries of powerful modern guns. The fleet comprises the battleships, which practically are floating forts, heavily armored but capable of high speed; the cruisers, less heavily armored but of greater speed; the double-turreted monitors for harbor defense, single-turreted monitors, gunboats, torpedo-boats, torpedo-boat destroyers and submarines, besides transports, supply ships, hospital ships and colliers. In spite of the fact that it was the Monitor that revolutionized naval warfare, substituting the iron-clad for the wooden vessel, comparatively little attention was paid to the development of the American navy for several years after the Civil War. Interest in a stronger navy was due largely to the dispute with Great Britain over what is known as the Venezuela Incident in 1896, and the war with Spain, two years later. And the acquisition of foreign possessions operated to the same effect. But the country had begun to fall behind in the work of naval construction until the European War again brought the question of the need of a larger navy to defend the country and protect commercial interests sharply to the front and a measure was passed, July 18, 1916, providing for the construction of a total of 157 new vessels of all classes, and for the development of the main elements of the fighting fleet so that there should be completed and in commission in 1921, 27 dreadnoughts of the first line, supported by 6 battle cruisers, 25 second line battle ships, 13 scout cruisers, 108 destroyers, 12 fleet submarines and 130 coast defense submarines.

Although the submarine had proved itself, in the European War, to be a very effective instrument for the destruction of merchant vessels, it played no important part in naval warfare, and in the adoption of the program of naval warfare in the United States the opinion was expressed—in the annual report of the Secretary of the Navy, following the adoption of the measure—that the battle ship is still "the backbone of the sea power



DEVELOPMENT OF FIGHTING SHIPS

10—Ancient Greek Galley. 11—Roman Trireme; three banks of oars. 12—The "Merrimac" and her antagonist the "Monitor," which revolutionized Naval Warfare. 13—Modern Torpedo Boat. 14—U. S. Frigate "Essex," Famous in War of 1812. 15—U. S. Monitor 'Puritan," Modern Type 16—Battle Ship.

of a nation." For this reason it was decided that the number, power, and size of the guns to be placed aboard these new battleships should be increased without sacrificing armor, speed or cruising radius.

The greatest impetus to the growth of naval armament began in 1870, following the unification of the Italian and German empires and the necessity they felt of establishing themselves upon the sea. Active naval construction in the United States began about 1890. Italy was the first to set the example of building enormous ships armed with monster guns. The development of the German navy was one of the most remarkable examples of efficiency in the history of modern naval construction. This development was effected in spite of considerable opposition on the part of the Reichstag, but had the advantage of the powerful influence of Emperor William II, and was stimulated by the friction arising between Great Britain and Germany over the Boer War.

The cruise around the world of the American fleet of sixteen battleships, in 1908, was the most notable feat of the kind in naval annals. Leaving Norfolk on December 16, 1917, the fleet sailed around South America, visited the chief ports of that continent and arrived at San Francisco without mishap and in condition ready for any service. Proceeding on its itinerary it visited Hawaii, the Philippines, Australia and Japan, and returned by way of the Suez Canal and the Mediterranean. This cruise was such a demonstration of naval efficiency that it attracted the attention of the world; the fleet was welcomed and féted by every nation it visited; and the efficiency of ships, officers and crews was fully demonstrated by this long and severe test.

Nazareth (*năz'ȧ-rĕth*), the Galilean home of Jesus, is a small and flourishing town in Palestine. It is built partly on rocky ridges in a hilly country. It is not mentioned in the Old Testament, and in the early part of the Christian era was almost forgotten, the first pilgrimage to it taking place in the sixth century. The town contains a Latin convent, built on the supposed scene of the annunciation, while the Greeks have also built a commemorative chapel. In addition there are a Latin chapel, supposedly built over the workshop of Joseph, and a temple of the "Table of Christ," containing the table from which the twelve apostles ate the last supper. The Virgin's well is just outside the town limits. The place has long been famed for the beauty of its women. The population in 1931 was 8,719.

Nebo, Mount, the highest point of the range of mountains east of Jordan in Moab. It was from its summit that Moses had his "Pisgah view" of Palestine. An ancient rude altar, probably as old as the time of the Amorites, was discovered here by Captain Conder in 1881.

Nebraska (*nē-brăs'kȧ*), the "Cornhusker" State, is one of the north central states of the American Union. Nebraska is an Omaha Indian name for the wide river Platte, which extends across the full breadth of the State. On the north, Nebraska is bounded by South Dakota; on the east by the Missouri River which separates it from Iowa and Missouri; on the south by Kansas and Colorado, and on the west by Wyoming. Its extreme length is 205 miles, its extreme breadth 415 miles. It is the fifteenth State in the Union as to size, extending over an area 76,808 square miles, 712 square miles of which are water.

Surface and Drainage. Vast prairies comprise the surface of Nebraska—gently rolling and sloping from an elevation of 5,300 feet in the western section of the State to 880 feet at the Missouri River. The State is somewhat hilly with few buttes on the western border, forming the approach of the foot hills to the Rocky Mountains. In the central part of the State and extending north, a low sand hill region now grown over with brush and vegetation offers an excellent grazing country. All the rivers of Nebraska flow into the Missouri. The majority of these waters are wide and shallow with sandy river beds. Few rivers are found in the western half of the State, while the eastern half is well dotted by small streams. Underground rivers form a network across the State as artesian wells ranging from 200 to 500 feet in depth have been sunk usually reaching a good supply of water. Much of the soil is made up of a sandy loam which is especially suited to agricultural products, having a rich vegetable mould formed over most of it.

Climate. Extreme temperatures are registered in Nebraska, during both the summer and winter seasons, but because of the dry pure atmosphere, suffering is not acute from these high records such as 110 degrees in the summer and forty degrees in the winter. The average annual temperature is a trifle over forty-eight degrees Fahrenheit. The rainfall varies. As much as thirty inches a year falls in the southeastern section and gradually diminishes to fifteen inches in the northwestern portion of the State. Little snow falls in Nebraska. The moisture storing quality of the oils helps considerably in balancing the deficiency of rainfall.

Minerals. Very few mineral deposits are found in Nebraska. Potash lakes dot the western border which produce nearly a half the country's entire output. A little lignite coal is mined in the northeastern and southwestern sections. Peat beds are also found in this region. Portland cement and lime are produced in fair quantities and a good grade of limestone is quarried for building purposes. Other mineral deposits include clays, pumice, stone, gravel, and salt. Some mineral waters are tapped but the quantity is comparatively small.

Production and Industry. Nebraska is predominantly an agricultural State. In 1930, there were 129,458 farms, consisting of 44,-

708,565 acres. Of this total acreage, 22,343,612 acres were under cultivation. Over eighty-five per cent of the State's area is given over to farms which have a tendency of decreasing in number but increasing in size. Corn is the staple and most important crop of the State. Other large crops are harvested of wheat, hay, oats, barley, rye, buckwheat, emmer and spelt, potatoes, apples and sugar-beets. Nebraska ranks fourth among the States of the Union in the production of sugar-beets. In 1930, there were 235,695,000 bushels of corn produced; 3,810,000 bushels of wheat, and 2,485,000 bushels of oats. There are 532,617 acres of irrigated land in western Nebraska, where the principal crop is durum wheat. At one time dry farming was carried on extensively, but in recent years many acres have been irrigated. Seventy-five per cent of the State's agricultural products consist of grains and seeds. The important seed crops are: alfalfa seed, clover seed, flaxseed, sorghum cane seed, millet seed, flower and garden seeds. Market vegetables are grown in large quantities around Omaha. In recent years berries and orchard fruits have become increasingly important. There is an abundance of apples, cherries, plums, peaches and grapes. Strawberries, raspberries, blackberries, gooseberries and currants thrive in the southeastern section of the State. There are 11,000 acres of national forest in the State. Nebraska was treeless when the pioneers trekked across these regions, but with the aid of the Federal government and systematic tree planting, the State now has numerous forests scattered within its boundaries.

Stock raising and slaughtering form the largest industry of the State. On January 1, 1932, there were 697,000 horses; 91,000 mules; 826,000 milk cows; 3,104,000 other cattle; 1,047,000 sheep and goats and 5,110,000 hogs in Nebraska. Dairy farming is becoming increasingly important each year. In 1931, 2,786,000 pounds of wool were clipped and marketed. The meat packing industry is centered in Omaha. Its stockyards are surpassed only by those of Chicago and Kansas City. Other important industries are the manufacturing of butter and cheese, and of leather products, which is a rapidly developing industry. Flour and grist mills are numerous in this grain producing State. Smelting and the refining of lead, copper and other ores is an important industry. Many railway cars are manufactured in the State.

Transportation. River navigation is used little except at Omaha where the Missouri River is used for freight traffic to southern points. Omaha is also the railroad center where ten trunk lines radiate across the State and to leading industrial points in surrounding states. The chief railroads are: The Union Pacific; Chicago and North Western; Chicago, Rock Island and Pacific; Chicago and Great Western; Chicago, Burlington, and Quincy, and Chicago, Milwaukee and St. Paul. There are 6,243 miles of steam railways in the State and 145 miles of electric roads. The State maintains 9,752 miles of highways, 5,632 miles of which are hard surfaced. The Lincoln Highway jointly maintained by the government and the states it traverses from the eastern to western coast, crosses the breadth of Nebraska, so that many tourists pass through the State on cross continental trips.

Population. In 1930 the population of Nebraska was 1,377,963, an increase of six per cent since 1920. There is an average of eighteen people to a square mile and only thirty-five per cent of the population is urban. One per cent of the total population is Negroes; eight per cent is foreign born white population. There are twelve square miles of Indian Reservations in the State, with a population of 4,358. Omaha is the largest city in the State, and in 1930 had a population of 214,006. Other important cities, with their populations in 1930, are: Lincoln, the capital, 75,993; Grand Island, 18,041, and Hastings, 15,490.

Education. The State has an educational policy singularly its own. The United States Government made a grant of 3,000,000 acres of public lands as a permanent endowment for schools. At present, there are 1,661,405 acres of this land in the hands of the State, of which the legislature has forbidden further sale, with few exceptions. The permanent school endowment amounts to $21,564,714 annually, which practically takes care of costs of the public school system. The total expenditures for the schools of the school year 1930-31 amounted to $28,114,616. There are 332,945 pupils enrolled in the schools of Nebraska between the ages of five and twenty years, a little better than seventy-six per cent of the population of children included within these years. The illiteracy is very low in the State, showing but 1.2 per cent in 1930. This has been decreased from 1.4 per cent of the 1920 census. Iowa is the only state in the Union having less illiteracy. Compulsory education is enforced in Nebraska for a term of at least six months for children between seven and sixteen years of age. There were 7,086 elementary schools in the State the school year of 1930-31, with 254,835 pupils enrolled and under the instruction of 14,523 teachers; 496 high schools with 64,377 pupils enrolled and under 3,414 teachers. There are four State Teachers' Schools in Nebraska, located at Kearney, Peru, Wayne and Chadron. In 1930-31 there were 6,805 students enrolled with a faculty of 210.

With sixty-five per cent of its population rural, the country school is given special attention in the State, and organized into one hundred consolidated school districts. The State provides text books for agriculture, domestic science and manual training, all three subjects being taught throughout the high schools. Higher education is provided by the State in its excellent University of Lincoln.

This institution was established in 1869 by an act of the territorial legislature and opened for instruction two years later. There were 7,940 students enrolled in the University for the school year 1932-33, with a faculty of 330. Besides the Graduate School, the University comprises the College of Arts and Sciences, including Fine Arts; the College of Engineering; the College of Agriculture; Colleges of Law, Medicine, Pharmacy, Business Administration and Dentistry, and two Teachers' Colleges. Summer school of twelve weeks and extension courses are maintained. The University is governed by a board of six regents, chosen by the State electors. The campus, which spreads over the residential section of Lincoln, extends over forty-five acres. There are more than twenty beautiful buildings. University Farm includes 320 acres, with an orchard of eighty acres and an agronomy farm of 160 acres. The College of Medicine is situated in Omaha. Experiment Stations are maintained at Scotts Bluff, Valentine, Culbertson and North Platte, under the supervision of the Board of Regents.

Creighton University at Omaha is a Roman Catholic institution. In 1932-33 there were 1,728 students enrolled. Nebraska Wesleyan University is a Methodist institution situated at Lincoln with an enrollment of 628 students, and Hastings College at Hastings is a Presbyterian institution with an enrollment of 600 students. Other small colleges in the State include York College at York; Cotner University at Bethany; Doane College at Crete; Grand Island College at Grand Island; Midland College at Fremont; Union College at College View, and Central College at Central City.

Government. The Constitution under which Nebraska is governed was adopted in 1875, but has been liberally amended, the most effective changes being in 1912 and 1920. These amendments provided for legislation through the initiative and the referendum, direct primaries for the election of State and national officers, for biennial rather than annual elections, and granting cities over 5,000 population to draw up their own charters. The State is divided into ninety-three counties. The legislature is composed of thirty-three Senators and 100 Representatives elected for two years. Sessions of the State Legislature convene in January of odd years.

The executive department includes the Governor as chief executive and the Lieutenant-Governor, Secretary of State, Auditor, Commissioner of Public Lands and Buildings, and the Superintendent of Public Instruction. All officers of the State serve for two years with the exception of the Superintendent of Public Instruction who serves four years.

The judicial department comprises a Supreme Court of seven justices, elected for six-year terms, District Courts each having one judge elected for a four-year term and Justices of the Peace.

Nebraska is represented in the National Congress in Washington by two Senators and five Representatives.

History. The region now known as Nebraska was first visited by Coronado, the Mexican general, in 1541. It is believed that Marquette touched this territory in 1673, and other French explorers and traders later followed the Platte River to the Forks. The first fur trading post was founded at Bellevue in 1807, and others established near the present location of Omaha and at Ft. Calhoun about the same time. The Lewis and Clark expedition explored parts of Nebraska in 1804-1806. In 1819 Stephen Long explored the Platte River across the State. His accounts of this country were most discouraging, describing it as the Great American desert. After the establishment of posts at Omaha and Nebraska City by the American Fur Company, a number of depots and forts sprung up to care for the onrush of gold seekers to California, the great Mormon exodus, the federal troops of the war fought in New Mexico, then a part of Mexico—and the ever increasing number of pioneers trekking across the continent in search of new country and new homes.

The territory included in Nebraska was originally ceded by France to Spain in 1763, then returned to France in 1801. It was sold to the United States by Napoleon as a part of the Louisiana Purchase. After Missouri was admitted as a State to the Union in 1821, the region included north of Texas and lying between the Rocky Mountains and Missouri River was unorganized for thirty-three years. The land now in the confines of Nebraska was reserved for the Indians, but was crossed by the continued flow of immigrants westward bound.

The Kansas-Nebraska Bill was passed in Congress in 1854 which organized the land between thirty-seven degrees and forty degrees North latitude into the Kansas Territory, and all north of forty degrees North latitude, into the Nebraska Territory. Contrary to the provisions of the Missouri Compromise, these territories could be admitted with or without slavery according to the constitutions adopted within each state. Great controversy ensued between the pro-slavery minded citizens of Kansas and the anti-slavery settlers in Iowa. The Civil War prevented all attempts of Nebraska Territory to become a State. Following the war, President Johnson failed to sign the bill passed by Congress, which would have admitted it to statehood. The act was finally passed over the President's veto and Nebraska became a State on March 1, 1867. The motto which appears on the State seal is "Equality before the Law" and the State embodied in its Constitution the right of elective franchise to all persons of race or color, excepting Indians not taxed. Settlement in the State was stimulated by the National Homestead Act of 1862, and the extending of the Union Pacific railroad across the State from

Omaha to Denver, Colorado, in 1867. Since this time the State has rapidly progressed in development of resources and industry and is now one of the most thriving agricultural mid-western states. In 1882 Congress added about 600 miles to the area of the State by extending the northern boundary eastward to the main channel of the Mississippi River. In 1898 the Trans-Mississippi Exposition was held at Omaha. The Constitutional Convention of 1919 and 1920 resulted in extensive changes in the constitution of the State.

Nebraska City, the seat of Otoe County, Nebraska, is situated on the Missouri River, fifty miles south of Omaha, and 160 miles north of Kansas City, Missouri. The city has a public library, government and county buildings and a well-organized system of public and parochial schools. Nebraska City is the seat of Nebraska College, the State institute for the blind, and the Academy of the Annunciation. The new Missouri vehicular bridge was opened in 1930, facilitating transportation. The city is served by two important railways and five trunk highways. It is the largest trading city within a radius of forty miles, of which it is the wholesale and retail center. Iron works and planing mills are situated here. The principal industries include pork packing, dairying, alfalfa and chicken feed, machinery supplies, shirt manufacture, brick kilns and food products. Wheat and corn are a large item in trade, as Nebraska City possesses terminal grain elevators. Much fruit, especially apples and cherries, is raised in the surrounding country. The population in 1930 was 7,230.

Nebraska, University of, is situated at Lincoln, the capital of the State. It is a part of the public-school system of Nebraska. It was founded by act of legislature in 1869, and is supported chiefly by a state tax, together with income from land sales and leases under Act of Congress of 1862, the annual revenue being about $270,000. It is governed by a board of six regents, chosen by the electors of the State. This board also has supervision over a number of other institutions of higher learning and special schools. The chief buildings of the University of Nebraska are located on a campus of forty-five acres in Lincoln. The academic, law, pharmaceutical and engineering instruction is centered there. On the University Farm of 320 acres are buildings chiefly for instruction in agriculture and home economics. There is also an agronomy farm of 160 acres and a fruit farm of eighty acres. The College of Medicine is located in Omaha. Altogether, the University comprises the following colleges and schools: graduate school, colleges of literature, science and arts, industrial college, college of law, school of fine arts, affiliated school of music. The faculty numbered 330 in 1932-33 with an enrollment of 7,940.

Nebraska Wesleyan University, a co-educational institution of learning under the auspices of the Methodist Episcopal Church, is situated at University Place, Lincoln, Nebraska. It comprises a college of liberal arts, a college of fine arts, a teachers' college and an academy. Nebraska Wesleyan University was founded in 1887. In 1933, the university enrollment was 628, and the faculty numbered thirty-nine.

Nebuchadrezzar (*nĕb-ŭ-kăd-rĕz′ ȧr*) or **Nebuchadnezzar,** the most illustrious of Babylonian kings, was the son of Nabopolassar, the general of the Babylonian garrison at the time the Assyrian empire fell to pieces after the death of Assurbani-pal. The Babylonians then threw off the hated yoke of Assyria, and Nabopolassar was proclaimed king of Babylonia in 625 B. C. Nebuchadrezzar succeded him in 604, reigning forty-three years, and was one of the greatest sovereigns who ever ruled over an ancient empire. He recovered the long-lost provinces, rebuilt palaces and temples as well as the city of Babylon, and captured and destroyed Jerusalem, taking the Jews into captivity. The Assyrians had previously carried away the ten northern tribes into captivity. Nebuchadrezzar greatly beautified Babylon. He caused a canal to be dug, called the king's canal, and also a huge reservoir to store the surplus water of the Euphrates River. The Hanging Gardens of Babylon, one of the seven wonders of the world, were constructed during his reign, because of a whim of one of his wives, who had been a princess of Media. The Hebrew Daniel rose to eminence in his service, chiefly as an interpreter of dreams, and an adviser to the king, who carried on conquests far into the northeast, and built a huge wall against the inroads of enemies. He is to be remembered rather as a builder than as a warrior. He was succeeded in 561 B. C. by his son Evilmerodach, who was murdered by his brother-in-law, chief seer at one of the temples. Nebuchadrezzar restored the glory of Babylon which had been destroyed by Sennacherib. The city became renowned throughout the world for its magnificence. His reign lasted until 556 B. C.

Nebulæ (*nĕb′ŭ-lē*), are celestial bodies resembling, in appearance, small patches of white cloud. Hence, the name, which is merely the Latin word for *small cloud.* Many thousands of these nebulæ have been measured and catalogued, but with the exception of two or three all are invisible to the naked eye. Until 1864 — five years after the invention of the spectroscope by Kirchhoff and Bunsen—nebulæ were considered to be very distant star-clusters, or clusters made up of stars so small as not to be resolvable by any existing telescope. But Sir William Huggins then examined a number of nebulæ with the spectroscope and found that they are not stars, but bodies composed of luminous gas, giving a spectrum of six or seven bright lines. Two of these lines are fairly bright and are due, as has been proved by

Keeler at Lick Observatory, to a substance not yet discovered on the earth. The brightest of all nebulæ is the one in the girdle of Andromeda; the one in the sword-handle of Orion can also be seen at times by the naked eye. *Planetary nebulæ* are those which show a more or less well-defined disc. It is not impossible that nebulæ are merely stars in their early stages of development, later to pass through the phases of *planetary nebulæ* and *nebulous stars.* See Scheiner's *Astronomical Spectroscopy,* translated by Frost.

Neb'ular Hypoth'esis is a theory advanced by three different men, Swedenborg (1688–1772), Kant (1724–1804) and Laplace (1749–1827), to account for the observed facts of planetary motion. The more important phenomena to be accounted for are these: (1) The orbits of all the planets are nearly circular and lie all nearly in one plane. (2) The direction of revolution about the sun is the same for all planets. (3) Except in the case of Uranus and Neptune, the direction of rotation of the planet on its axis is the same as its direction of revolution. (4) The larger planets rotate (not revolve) more rapidly. (5) The plane of rotation is not very different from the plane of the orbit. (6) The satellites generally have a direction of revolution which coincides with that of the planet's rotation. To explain this rather orderly state of affairs it was supposed that the matter now constituting this solar system was at some earlier date in its existence distributed in the form of an immense nebula; and that, as this nebula condensed and therefore increased its rate of rotation (while preserving a constant moment of momentum), the centrifugal force became so great that some of the outer portions of the nebula were set free. That is, the centrifugal force reached a point where it balanced the attraction of the rest of the nebula. The portions thus set free, whether as a ring or as a "hump," condensed still farther and formed the earlier planets. As the concentration of the original nebula proceeded, the rate of rotation kept on increasing and again "threw off" or set free other planets. So also with the planets themselves; as they became more and more compact, their rate of rotation increased sufficiently for them to set free their satellites.

In a general way this hypothesis satisfactorily explains the six facts enumerated above. With later modifications it explains even many of the anomalies of the solar system. See LAPLACE. For recent criticism of this hypothesis see article by Moulton in *Astrophysical Journal*, Vol. II. (1900).

Neck'ar, a river in Germany, flowing through Württemberg and Baden; it is one of the largest tributaries of the Rhine, rises on the eastern slope of the Black Forest, and pursues a winding course for 250 miles until it enters the Rhine at Mannheim. It is navigable for about half its lower length. Tübingen, Heidelberg, Heilbronn and Cannstatt are on its banks.

Neck'er, Jacques, a financier and minister of France, was born at Geneva, Sept. 30, 1732. At 15 he went to Paris as a bank-clerk, and in 1762 founded the London and Paris Bank of Thellusson and Necker. He entered public life as a syndic of the French East India Company and minister of the republic of Geneva at Paris, and about this time married. In 1773 he received the French Academy prize for a eulogy on Colbert, and won great recognition by his *Essai sur le Commerce des Grains* in 1775. This was an answer to the free-trade arguments of Turgot. After having loaned some money to the government, he was made director of the treasury in 1776 and director-general of finance in 1777. For five years he labored to improve the financial condition of France by readjusting the taxes, establishing state-guaranteed annuities and the present system of government pawnshops. His methods displeased the queen, however, and his publication of the *Compte Rendu*, a statement of the financial condition of France, in 1781, was made the cause of his dismissal. He thereupon withdrew to Geneva, but returned in 1787 and defended his *Compte Rendu,* for which he was banished from Paris. He was recalled to his office in September, 1788, but, while winning popularity through recommending the summoning of the states-general, he proved wholly incompetent during the storms of the Revolution. He declined the aid of Lafayette and Mirabeau, and on July 11, 1789, was ordered to leave France, but after the fall of the Bastille, three days later, he was recalled, only to resign voluntarily in September, 1790. He retired to his estate near Geneva, and died there on April 9, 1804. See *The Private Life of M. Necker* by Madame de Stael, his famous daughter.

Nec'tar, the name given by most of the Greek and Roman poets to the drink of the gods. Homer describes it as of a red color, and says that continued use of it was supposed to insure immortality. The sprinkling with nectar was supposed to confer perpetual youth, and it was used, in figure of speech, as meaning everything delightful and pleasant to the taste.

Nee'dle. The sewing-needle must be one of the oldest implements used by man. Bone needles with eyes are found in the reindeer caves of France, and on the sites of the prehistoric lake dwellings of central Europe have been found many "eyed" needles of bone and of bronze, but only one of iron. Ancient bronze

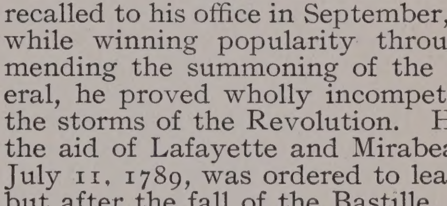


FIG. 1

needles, 3½ inches long, have been found in Egypt, and there are surgeon's needles and thimbles which have been used in sewing, with ordinary needles recovered from Pompeii in the Naples Museum. Savage races use needles of various materials, as bone, ivory, wood and metal

Steel needles were first made in Nuremberg in 1370, but the manufacture was not of much importance until about 1650. The early made needles were all square-eyed. Redditch, near Birmingham, is the seat of the needle manufacture in Great Britain, and great improvements have been made by the use of automatic machines and other new mechanical appliances. There are about 22 processes now used in the making of needles. First, fine steel wire is cut into double lengths; these are raised to a dull-red heat and placed in loose bundles inside iron rings, to be straightened by rolling each bundle backward and forward on a face plate with a slightly curved bar (Fig. 1), through which the rings project. Next the wires are pointed at both ends and then stamped in the middle, so as to produce the flat part of the eyes and the mark for the holes (Fig. 2); two oval holes are then punched by a vertical, belt-driven, punching-machine. After being eyed the double needles, joined at the heads by thin fins, are "spitted" through their eyes on two wires flattened at one end so as to retain them. The burr made by the punch and die is now filed away, and after being broken in two between the heads and filed smooth, a row of single needles is left on each spit, as shown in Fig. 3. Next they are tempered by heating and dipping in oil, then polished, cleaned and sorted. It is estimated that 50,000,000 needles are made weekly in the Redditch district.

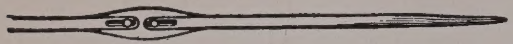


FIG. 2

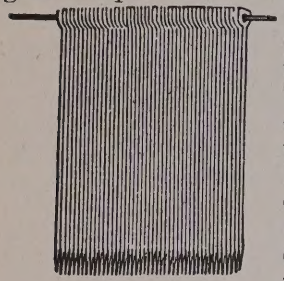
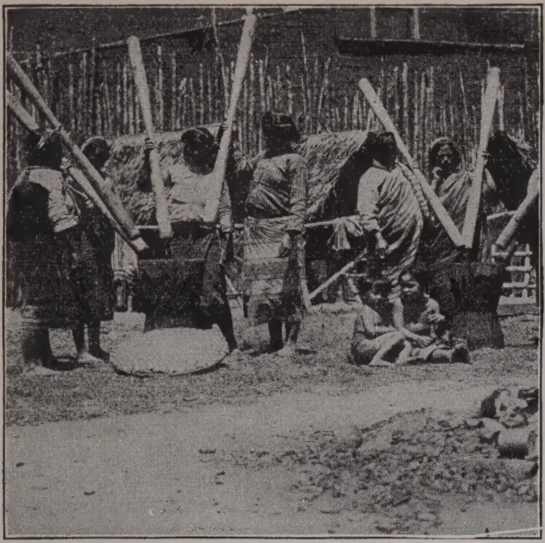


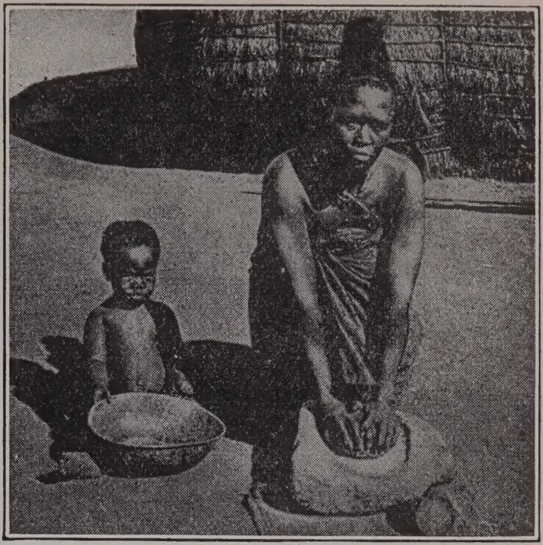
FIG. 3

Nee'dle-Gun. See RIFLE.

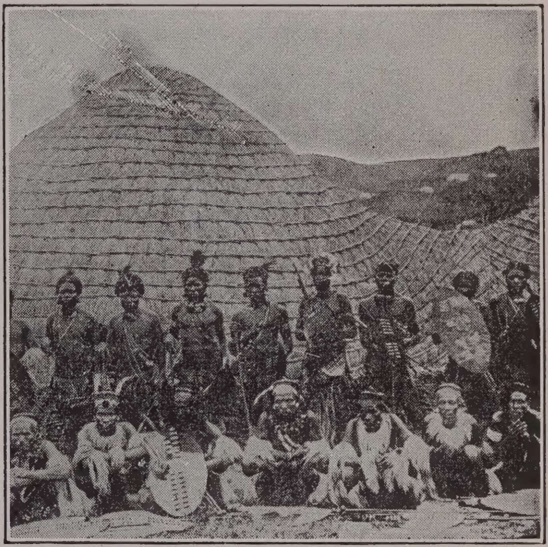
Ne'gro, The Education of the. The first negroes were landed in the United States at Jamestown in 1619. Within less than a century from that date there were over 50,000 here and by 1819 there were more than 1,500,000. There now are about 10,000,000. The education of these people, according to the common meaning of the term, was begun only with their emancipation from slavery. The sudden emancipation of the negro was followed by a state bordering upon chaos, and it took a long time for things to adjust themselves to the new conditions. Both the whites and the negroes were all at sea. The whites knew the negro only as a slave and themselves as their masters. The negro knew only to serve. Both were ill-prepared to adjust themselves to the new relation. It is not surprising that the negro went the full sweep of the pendulum. Emancipation from slavery meant to many emancipation from labor. Manual labor, the only kind for which the negro was prepared, was considered degrading; and it is not too much to say that influences were present that tended to confirm him in this idea. Following the emancipation, schools were established in great numbers. Missionary societies became active. Armies of teachers were rushed down from the north. The United States army exercised its usual zeal in furthering the work. The Rev. John Eaton, afterwards United States Commissioner of Education, was placed by General Grant in charge of the instruction for the emancipated race. Within five years after the close of the war more than $5,000,000 was expended by these organizations for educational purposes. On May 20, 1865, the Freedmen's Bureau was established by the national government, and Major-General O. O. Howard was made commissioner in charge. During the five years of its operation it made a total expenditure of more than $6,000,000, the larger portion for educational purposes. Over against all this enthusiasm on the part of the northern educator was the silent though persistent distrust on the part of the southern whites. They looked upon the negro as being fit only for manual labor and questioned the advisability of any attempt to train him along academic lines. The northern enthusiast was anxious to show them that the negro was as capable to learn as the whites. In the midst of it all it can not be considered strange that the tendency on the part of the negro was to discount the worth of industrial skill and to place an over-valuation on academic learning. Great harm as well as great good followed these methods. On the one hand, a great many negroes were led to consider themselves too good for manual labor as soon as they received a little learning, and on the other many were found who showed themselves capable of becoming good and efficient teachers and preachers, doctors and lawyers as well, and the wisdom and economy of providing schools with teachers of their own race was suggested. During the decade ending in 1878 more than 25 normal schools and collegiate institutes under control of different religious denominations were founded. These schools sent out many well-trained and efficient teachers. Unfortunately, however, these schools seemed to encourage rather than eradicate the negro's well-developed notion that manual labor was degrading and that the way of escape was by study along academic lines. Latin and Greek occupied a prominent place in

IN THE BLACK CHILD'S HOME

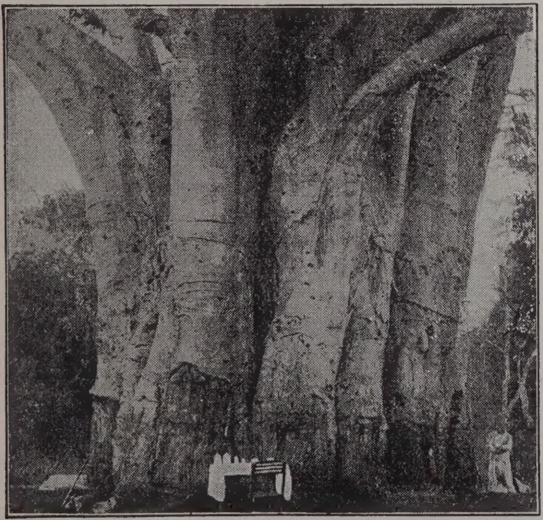


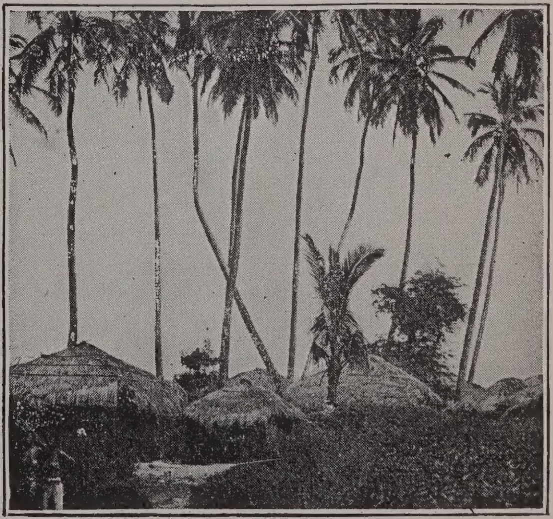


Among all nations before mills are introduced, people must crush their own grain before they can bake it. In Africa they do this in mortars with big pestles.

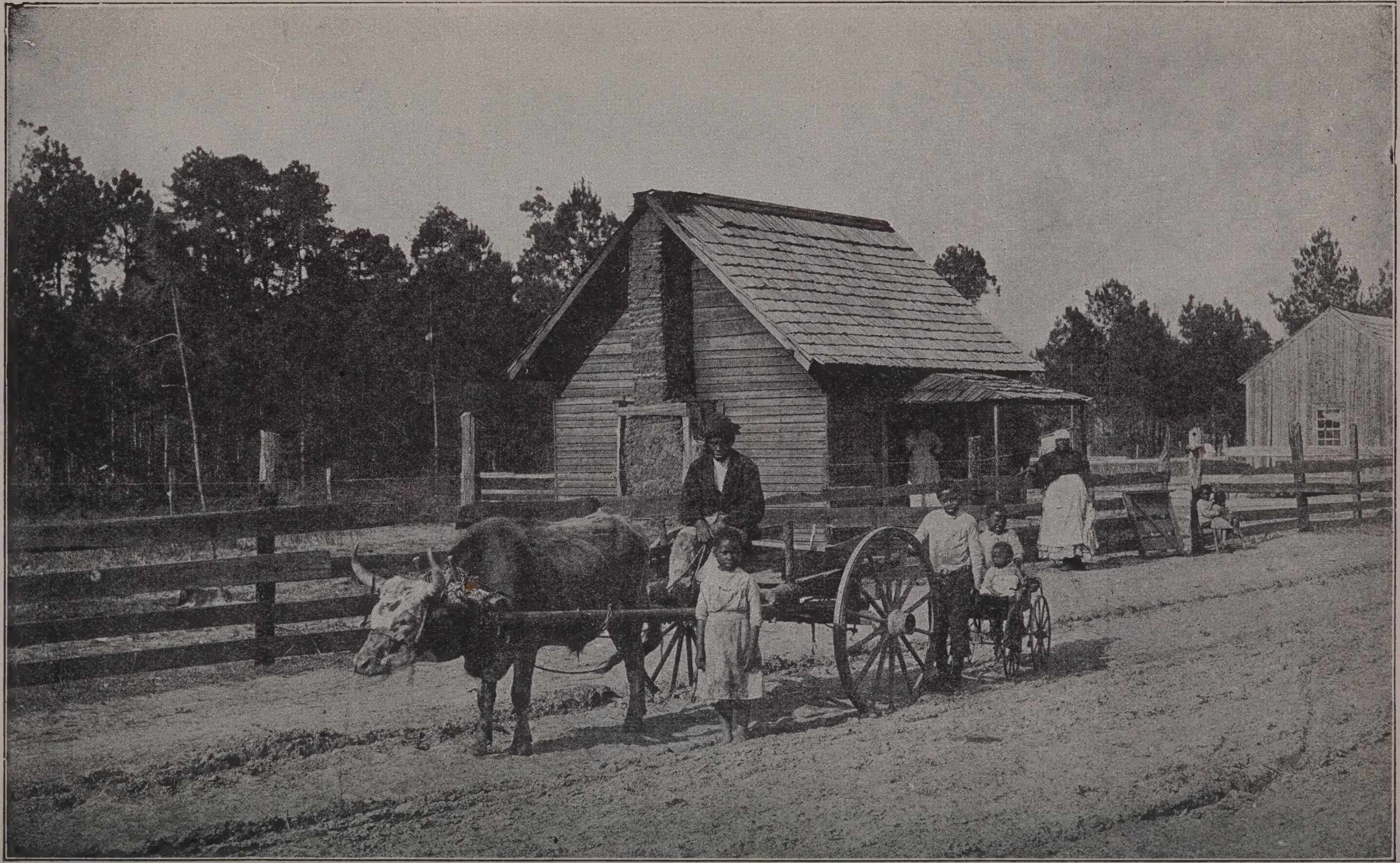


On the left is a group of African natives on the Zambesi river, and beside them a band of Zulus, a people who are particularly troublesome when on the warpath.





You can guess from its name what animal is fond of the fruit of this giant monkey-bread tree. Compare it with the slender palm trees on the right and the huts there shown with the one back of the Zulu warriors.



A HAPPY NEGRO FAMILY IN ALABAMA.

the curriculum; the literary and academic side was too much emphasized; and little or no attention was given to the practical side. For this these schools have been severely criticized. But each year is giving to these institutions, as to the colleges of the north, curricula which have more vital connection with the life the student is to live. In this direction no single influence has been so potent as that of Hampton Institute (*q. v.*), founded in 1868 by General Samuel Chapman Armstrong (*q. v.*). Its fundamental work has been the training of teachers, and industrial training was incorporated at the beginning and has continued a dominant factor. From Hampton sprang Tuskegee Institute (*q. v.*), a larger institution of the same kind, founded in 1881 by Booker T. Washington (*q. v.*). It would be difficult to overestimate the importance of these two institutions and the value of the services of their two honored founders in the development of the education of the negro. In the secondary and higher schools for negroes, not including public schools, in the former 16 slave-states and the District of Columbia there were 20,972 pupils in 1904-5 receiving industrial training in farm-work, carpentry, sewing, cooking and other branches, while the total enrollment in these institutions was 42,889. The total value of the grounds, buildings, furniture and scientific apparatus was $11,102,283. A vast amount of money has been contributed by northern philanthropists to the support of these institutions, although an income of about $250,000 was derived in 1904-5 from tuition alone. These contributions, which began to pour into these states before the battle-drums had ceased and continue to the present day, now aggregate nearly $50,000,000. It was 1870 before much was undertaken in the way of establishing free public schools, but since that date rapid progress has been made. Separate schools for negroes are maintained in all of these states, with an enrollment in 1904-5 of 1,602,194 in the elementary schools and 50,251 in the higher schools and an average daily attendance of more than 60 per cent. of the enrollment. This was larger than the enrollment of both the whites and negroes in 1876–7. The number of teachers aggregated about 29,000. Although separate schools have been maintained, separate accounts have not been kept. But for 1904–5 the sum of $46,401,832 was expended for the support of common schools for both whites and negroes, and according to very careful estimates 20 per cent. of the total or about $9,000,000 was expended for the support of the schools for negroes, about as much as was expended for schools for negroes and whites in 1870. This growth and development has been gradual though rapid, and augurs well for the future. In the public schools, also, more and more emphasis is being placed on the side of industrial training, and the life the pupil is to live is receiving greater attention.

Ne'groes, a name given to most of the races inhabiting Africa, though it does not include all the inhabitants. The inhabitants of northern Africa, as the Abyssinians or Nubians, and the Hottentots of the south do not belong to the negro race. The physical characteristics of the true negro are black skin, woolly hair, flat nose and thick lips. Their skin is soft, and in the infant is a dull red, becoming black very soon. The negroes of the Guinea coast, who are rude savages, have a deep-black color and ugly features. Other tribes of the interior are tall, well-formed and warlike, and have some ingenuity in making implements from iron. The skull is long and narrow, with low forehead, prominent jaws and retreating chin. As a rule they are of a low order of intelligence, mechanical in their work but capable of great endurance. They are of a less nervous disposition than whites, more frequently color-blind, have smaller lungs and larger livers. The negro has long been a prey to the slave-traffic, being captured in large numbers and sold as slaves in other countries. The first slaves were brought to the United States in 1619, and this traffic was not discontinued until 1794, when it was prohibited by act of congress. The Spaniards began the trade, and King James and Queen Elizabeth both issued patents to companies. Between 1794 and 1840 the trade was confined mostly from the African coast to the West Indies and Brazil. The coast of Guinea was the largest slave-market, but inasmuch as they sold none of their own people but relied on those captured in war or by strategem, most of the slaves sent to the United States were of the pure negro type of the interior; while most of those taken to Brazil and the West Indies were closely allied to the Kafir and Zulu stock of the eastern coast. The mortality among the negroes is greater than the whites, attributed in the south much to the fact of their low condition and inattention to the laws of health, in the north to their inability to withstand the cold and variable weather, as the diseases from which they suffer are mostly those of the respiratory organs. Therefore the publication, at frequent intervals, of accounts of long-lived negroes may be ascribed to the ignorance of their ages, and not to any exceptional tenacity of life.

In disposition the negro, as a rule, is cheerful and peaceable, unconcerned for the future, inclined to live in colonies and of emotionally religious instincts. Common among them even to the present day is the exercise of a certain form of witchcraft, called *voodooism*, prosecuted by means of charms, philters and fetiches.

The African negroes are quite ingenious in weaving mats and cloth and in making baskets from grasses; in constructing their huts;

and in making various utensils and implements for household use. They all acknowledge a supreme power, and are much given to a belief in witchcraft, charms and spells. They have wooden images, which they think have power to drive away evil spirits and to protect them from sickness and witchcraft. They are fond of music, and make various musical instruments of simple and rude character. Among the negroes in this country many become skillful in the use of musical instruments, especially the violin and the banjo Since the emancipation of the slaves in this country many individuals have developed an ambition for education and the accumulation of property.

Nehemi'ah, a leader of the Jews after the exile, was a Jew holding the office of cupbearer to Artaxerxes when he heard of the unprosperous condition of Jerusalem. In the following year (444 B. C.) he obtained leave of absence and power to act as governor extraordinary of Judæa, and arriving at the city caused its walls to be rebuilt, enlarged the population by drafts upon surrounding districts and brought back the Levites who had been forced to leave. On his second visit. 12 years later, he began new reforms, notably the movement against mixed marriages, the cleansing of the temple, a strict law of Sabbath observance and a provision for the maintenance of the temple and priests. *The Book of Nehemiah* originally formed the closing chapters of the undivided work, *Chronicles, Ezra and Nehemiah,* containing the memoirs of Ezra and Nehemiah.

Nel'son, in the Kootenay district of British Columbia, is on the south bank of Kootenay River at the head of the rapids. It has 5,273 inhabitants, largely interested in the silver mines and smelters near by.

Nel'son River, a river in Keewatin District of the Canadian Dominion, has its source in Lake Winnipeg, and flows 400 miles northeasterly into Hudson Bay, discharging an immense volume of water. It is navigable for 127 miles from its mouth, but only for 70 or 80 miles for large steamers. Its chief feeder is the Saskatchewan, which empties into Lake Winnipeg.

Nel'son, Horatio. In the rectory of Burnham Thorpe, Norfolk, England, there was born, Sept. 29, 1758, the greatest naval commander of the greatest maritime power in history. Like James Watt, Horatio Nelson was so frail of body that it was not thought probable he would live to maturity. His father's small income as a clergyman and large family, forced the boy out of the home nest. At 12 he was entered as a midshipman in the navy. His maternal uncle, on whose vessel he made his first voyage, thought that the idea of trying to make a sailor out of the delicate, undersized boy was a piece of folly and that the most merciful course would be to discourage him So on the first day at sea, he ordered the boy aloft saying: "You are afraid, lad?" "Yes sir," replied the shivering morsel of a man; "I'm afraid, but I'm going to the top of the mast, sir." And go he did, but he never forgot that sickening experience.

When at 21 he was captain of a frigate, he always raced the new boys up the mast and saluted them at the top. The little fellows, frightened half to death but full of British grit, never disappointed him. He abolished the punishments then practiced, saying that cruelty made cowards. He promoted brave men and treated members of the crew with great consideration. As a result his ships were famed for good order and for gallantry in action. To his men he was not an officer but "Our Nel." At Corsica he lost an eye, at Teneriffe an arm. In the battle of Copenhagen he pretended that he was unable to see a signal to retreat, sailed into the thick of the fight and saved the day. When told that, if he had failed, he would have been executed for disobeying orders,—"Oh, no," he replied. "If I had failed, I and my ship and men would all have gone to the bottom." In his naval career of 35 years he never retreated or struck his colors.

As an admiral in command of a fleet he won his first victory in the battle of the Nile, Aug. 1, 1798, smashing the French fleet, on which Napoleon in Egypt depended for transport and supplies, so completely that the campaign had to be abandoned. Idol of England at 40, he was raised to the peerage and granted a fortune. Three years later he was made vice-admiral and a viscount. As the shadow of Napoleon lengthened across the English Channel, Lord Nelson's visibly failing health alarmed the country. To have ordered him out would have been inhuman, but he came forward voluntarily in May, 1803, and offered his remaining days in defense of the empire. There was no one else; England had no choice but to accept the sacrifice. For 14 months he lay in the Mediterranean off the port of Toulon. When the French fleet slipped out, he chased it to the West Indies and back; laid siege to it and the allied Spanish fleet in the harbor of Cadiz; and brought them both to bay off Cape Trafalgar, October 21, 1805. In going into battle Nelson flew from the masthead of the *Victory* the signal that now is Britain's watchword: "England expects that every man will do his duty."

The fleets of the enemy were destroyed, but in the hour of triumph the great commander fell mortally wounded on the deck of the flagship. As he lay in a midshipman's bunk, dying, wild cheers rang out, as ship after ship struck its colors or sank beneath the wave.

"England is safe," he murmured, looking up into the face of the officer who bent above him. His simple, loving heart turned like a boy's to his old comrade in arms for the last office of affection. His last words, before his soul drifted out to the great unknown, were: "Kiss me, Hardy!"

The flagship brought the news of the victory home, but its flags were at half-mast. England's bravest and best-beloved hero was laid away in St. Paul's, London, under a splendid monument. In 1905 the centennial of Trafalgar was made a Nelson year throughout the empire. In the press and in public addresses he was never spoken of as Lord Nelson the admiral, but as "Our Nel." Tennyson, in his *Ode on The Death of the Duke of Wellington*, addressed Nelson as the "greatest seaman since our world began," saying, as Wellington was laid beside Nelson: "Mighty sailor, this is he was great by land as thou by sea." See *Life of Nelson* by Robert Southey the poet.

Nem'esis, said by Hesiod to be the daughter of Night, was at first the embodiment of righteous moral feelings or of the conscience. Later, Nemesis was regarded as the power which balanced the fortunes of people and taught them to reverence the immortal gods. From this was evolved the latest conception, that of the avenger of wrong. She was at first represented as a young virgin, and later as clothed in a tunic, sometimes with sword in hand and a wheel at her feet, or in a chariot drawn by griffins. Several fragments of Pheidias' statue of Nemesis were discovered in 1890, in the famous temple of Nemesis at Rhamnus, Africa.

Ne'on. See ARGON.

Nep'tune, the Roman god of the sea, was like all the other gods of mythology, merely a name. This was derived from Nethunus, the sea-god of the Etruscans. He is also identified with the Greek sea-god Poseidon. The figure of a bearded man standing in a shell drawn over the sea and holding a three-pronged spear or trident is his usual pictorial representation.

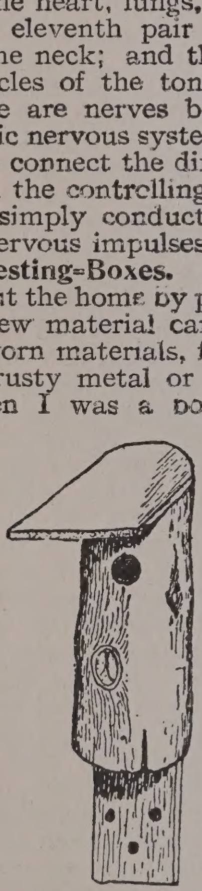
Nep'tune. See PLANETS.

Nerbud'da or **Narba'da,** an Indian river of about 800 miles, with a drainage of 36,400 square miles, rises on the Amorkantak plateau, 3,493 feet above sea-level, and flows west through the central provinces and the great channel between the Vindhya and Satpura Mountains into the Gulf of Cambay. It is navigable for only about 80 miles from its mouth. The Hindus consider it a sacred river and look upon a foot-journey from mouth to source and back as a meritorious act.

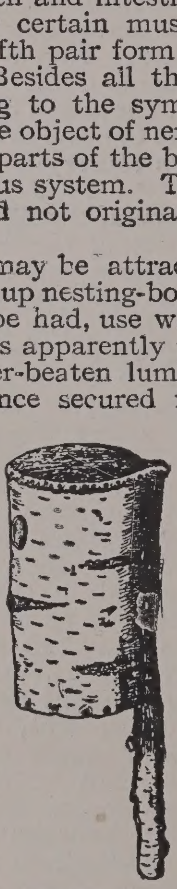
Ne'ro, the last of the Cæsars and emperor of Rome from 54 to 68 A. D., was born at Antium Dec. 15, 37. His mother became the wife of the Emperor Claudius, who adopted him, and on the emperor's death he was declared emperor by the Prætorian Guards instead of Claudius' own son, and this choice was ratified by the senate and provinces in 54. His reign, although opening well and moderately, soon became one of crime, debauchery and tyranny. He caused Britannicus, Claudius' son, to be poisoned, brought about the murder of his own mother and finally divorced and murdered his wife. All this was accompanied by wars and insurrections,—in 61 A. D. an uprising in Britain, which was suppressed, and in 62 the war with the Parthians and Armenia. In 64 a great fire destroyed nearly two thirds of Rome, and historians say that Nero applied the torch and sat far away admiring the scene. Nero used the Christians as scapegoats, and had many of them put to death. Through the high-handed imposition of taxes he rebuilt Rome and erected the "golden house" for himself on the Palatine. A conspiracy against him in 65 failed and caused the death of Seneca and others. He kicked his second wife to death and afterward offered his hand to Antonia, the daughter of Claudius, who, upon refusing him, was put to death, as was also the husband of Statilia Messalina, whom he thereupon married. His inordinate vanity caused him to believe that he was everything brilliant, as is witnessed by his last words: "What an artist is lost in me!" In 68 the Prætorian Guards rose against him and, in conjunction with the Gallic and Spanish legions, proclaimed Galba emperor. Nero fled from Rome, was declared an enemy of his country, and to save himself from execution committed suicide. See W. Wolfe Capes' *Early Roman Empire* and Merivale's *History of the Romans under the Empire*.

Nerves, the fibers of white nervous matter connecting the different parts of the body with the central nervous system. Two kinds of nervous tissue are recognized,—the white and gray. The white is composed of fibers, the gray is largely made of nerve cells located in centers. The nerves are merely conductors of the nervous impulses that arise within the nerve-cells. Nerves make their first appearance in the animal kingdom among the jellyfish as parts of the primitive nervous system. They at first are strands of protoplasm connected with the nerve-cells from which they grow. They become associated in bundles, bound together by connective tissue, and thus form the white cords that run amongst the muscles and other parts of the body. In the human body there are twelve pairs of cranial nerves connected with the head and thirty-one pairs of spinal nerves connected with the spinal cord. Those of the head are much more complex than those of the spinal cord, but are believed to be derived from a simpler condition in which they were equivalent to them. They are now so much modified that it is difficult to understand them. The thirty-one pairs of spinal nerves come from two roots closely joined to the spinal cord. These are called sensory and motor roots, respectively, because those at the back contain sensory fibers and those in front motor fibers. Recent observations have established a great law in reference to the development of nerves, viz., the sensory fibers arise outside and grow into the central nervous system, motor fibers start within the central nervous system and grow outward. This applies even to the highest developed sensory nerves. For example, the fibers of the optic nerve begin in the retina of the eye and grow toward the brain, instead of starting in the brain and growing outward to the eye. Besides sensory and motor fibers there are those that regulate the nutrition and the tone of organs, called trophic nerves; those that carry impulses which stimulate secretion, called secretory nerves; and some others. The twelve pairs of cranial nerves are as follows: The first pair connected with smell; the second pair with sight; the third, fourth and sixth pairs with muscles that move the eyeball; the fifth pair with the teeth, tongue and face; the seventh pair the muscles of the face, the eighth pair the ears; the ninth pair the tongue, as nerves of taste, and with the muscles of the pharynx. The tenth pair (pneumogastric) are very important and widely distributed, going to the heart, lungs, stomach and intestines. The eleventh pair supply certain muscles in the neck; and the twelfth pair form the muscles of the tongue. Besides all these, there are nerves belonging to the sympathetic nervous system. The object of nerves is to connect the different parts of the body with the controlling nervous system. They are simply conductors and not originators of nervous impulses.

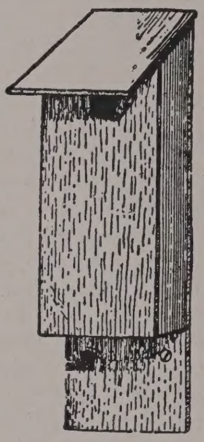
Nesting-Boxes. Birds may be attracted about the home by putting up nesting-boxes. If new material can not be had, use waste or worn materials, for birds apparently prefer rusty metal or weather-beaten lumber. When I was a boy, I once secured four old shingles and a piece of board, made a rough box with hatchet and saw, and put it up in a tree. Many a pair of bluebirds nested there. Such a shingle-box may be put against the side of a building or on a tall pole or tree-trunk where cats can not easily climb. Better nail a shingle or some thin board flat on the top, and have it project on every side. If the board projects well out over the entrance, it will prevent the rain from driving in as well as make the roof rainproof. When hollow limbs are pruned from a tree, cut them into sections, and roof, bore and mount them. (See first illustration.) A handsome as well as durable box may be made of bark. It must be made late in June, when the bark peels readily. It is made by peeling off both the outer and the inner bark. Then saw a slice off each end of the stick for the bottom and the top, tack the bark on the ends, nail on the supporting stick, and finally, in order to make the top watertight, cover it with green bark. (See second cut.) These small boxes are suitable for the chickadee. Chestnut-bark makes strong boxes, that can be covered or roofed with zinc, for larger birds. An objection to many bird-houses is that they are not cat-proof. But a very deep box, without a perch, but with an overhanging cover or roof and with the entrance well up under the eaves, makes access difficult for the cat. The ordinary bird-house for martins or tree-swallows must stand on a tall, slim pole, these birds preferring to be 15 to 30 feet above the ground. Be sure not to make the entrance near the floor. Make a platform round the box, and rail the platform up at least three inches. Regulate the size and shape of bird-boxes by the shape and habits of the different birds. It is better to make them comfortably large than too small. The size of the entrance is most important. One and seven-eighths inches diameter will do for wrens; one and one-fourth for martins; three and one-half for flickers and screech-owls. Both bluebirds and tree-swallows have been known to nest in boxes hung from a wire. Provide every small nesting-box with a sliding cover, or a door, through which you can remove the contents. All the boxes I have mentioned, except shingle and bark boxes, provide for this, and these too



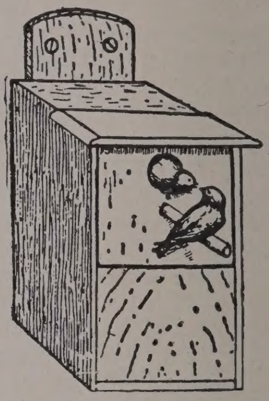
HOLLOW-LIMB BOX



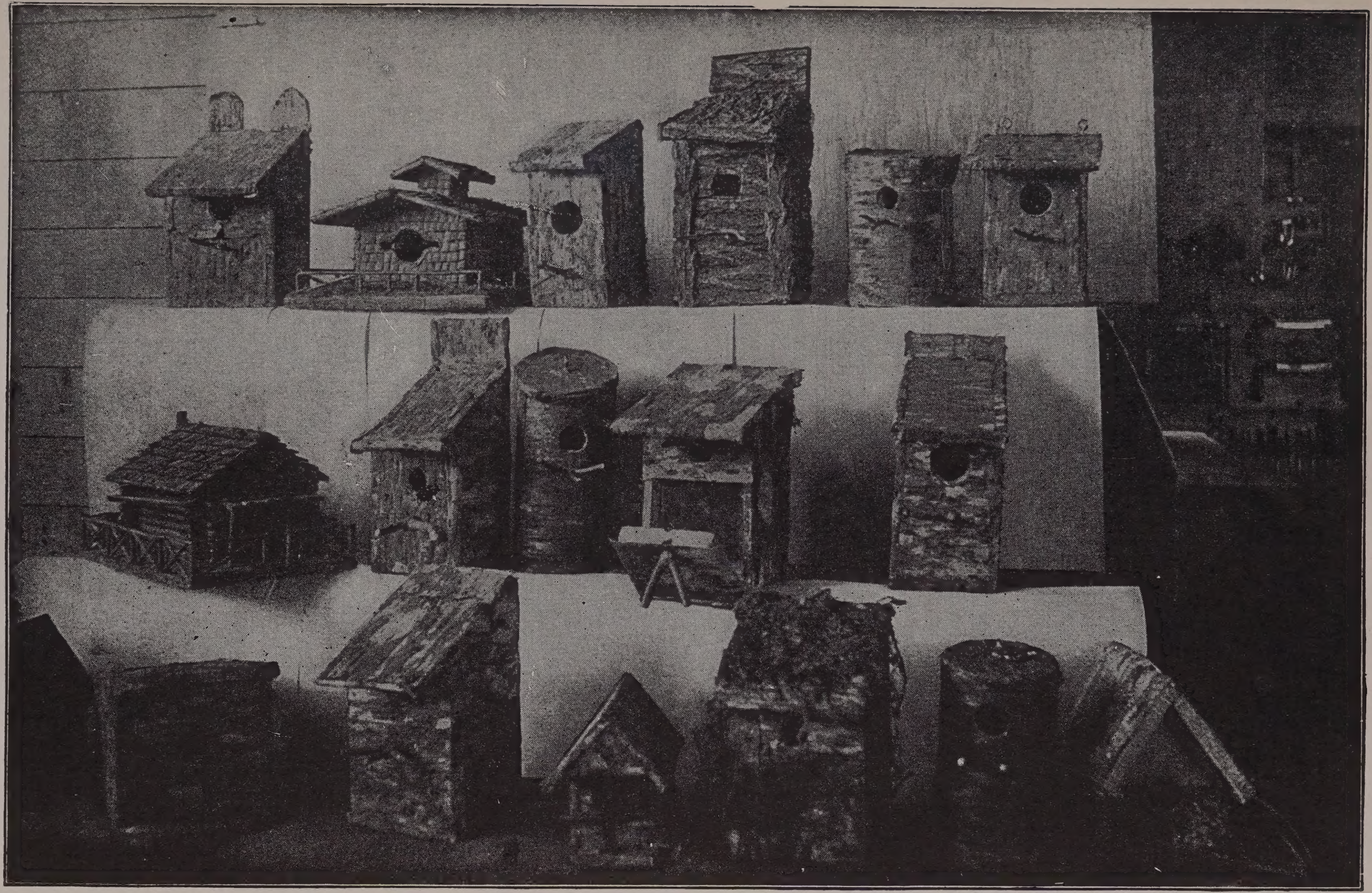
BARK BOX



BLUEBIRDS' BOX



SLIDING-COVER BOX



BIRD HOUSES MADE BY MANUAL TRAINING CLASS, PUBLIC SCHOOLS, PORTLAND, OREGON can easily be made to open. See the box shown in picture four. The door extends halfway down the front, and is attached to a narrow cover which overlaps part of the top of the box. For those who wish to study the habits of birds the observation-box (see cut) is almost perfect. One side is furnished with a pane of glass, and a door shuts over the glass. The door is kept closed most of the time till the young are hatched. Then it can be kept open to notice their ways, but the sun must not shine on it, for it might kill them. The box can be mounted on a short board projecting from the window-sill. The door is hinged at the bottom by a piece of leather, and opens toward the window.

Nes'tor, the great counselor of the Greeks, was born in Messenian Pylos, the son of Neleus and Chloris, and became the husband of Eurydice. In his youth he fought valiantly against the Arcadians, Epeans and Centaurs, and in old age was famed for wisdom. He joined the war against Troy with sixty ships, and, although an old man, remained through the war, returning to Pylos at its close and ruling until his death.

Nestor'ians, a sect formed in the 5th century by the followers of Nestorius, patriarch of Constantinople in 428 A. D., deposed in 431 because of his peculiar views as to the divine and human nature of Christ After it was driven out of the Roman empire, the sect extended into Persia, India and even China. In Asia Minor, under Bishop Babæus of Seleucia (498-503) and his successor, the Nestorians grew rapidly and produced many learned theologians, philosophers and physicians. as Hippocrates and Galen. Under the rule of the caliphs the Nestorians enjoyed toleration, and spread in Arabia, Syria and Palestine. The Prester John of romance was a Christian of this color, and tradition has it that Mohammed learned what he knew of Christianity from a Nestorian monk. The sect reached the height of its prosperity in the middle of the 13th century, but after the persecutions of Tamerlane they dwindled away They now are a poor and illiterate race numbering less than 150,000. Their chief seat is in Persia and in the mountains of Kurdistan.

Neth'erlands. See HOLLAND.

Net'tle, species of *Urtica*, a genus containing about 30 species widely distributed. The best known nettle is *U. dioica*, known as the stinging nettle, which is a native of Europe and Asia, but has become extensively naturalized in the United States. It is densely beset with stinging hairs. At the base of each hair is a small gland secreting a poisonous fluid. It grows from two to three feet high and is common in waste places.

Neuchâtel or **Neufchâtel** (*nĕ'shä'tĕl'*), the chief town of the canton of Neuchâtel in Switzerland, is situated on the northwestern shore of the Lake of Neuchâtel, about 85 miles from Geneva, and is noted for its charitable, educational and artistic institutions. It mainly manufactures watches, jewelry and lace, but not the Neufchâtel cream-cheese; this comes from a small Norman town called Neufchâtelen-Bray. Population 23,505. The canton of Neuchâtel has an area of 312 square miles, and in 1910 had a population of 132,184.

Neuchâtel, Lake of, is all that is left of the large body of water which at one time covered the whole lower valley of the Aar in western Switzerland. Its greatest dimensions are 25 miles long and 6 wide, and its area 92 square miles. It is fed by the Thièle and the Reuse, and drained by the Thièle through the Lake of Bernice and thence into the Aar. Its elevation is 1,424 feet above sea-level, and its northwestern shore is rich and cultivated, but the opposite side is barren and rocky. It has pleasing though not remarkable scenery and is famous mostly for the discovery or the ancient remains of water-dwellings in it.

Neutral'ity, or the state in which a nation remains friendly to each of two nations which are at war with each other, is a rather novel invention in the history of nations. In ancient and even in medieval history a nation might be more or less neutral, but never entirely so, in the event of a war between its neighbors. At the present time there is a recognized code of conduct for neutral nations, which finds a place in international law. Neutrality, while not so perfectly defined that there may be no more dispute, in general requires the following mode of behavior on the part of the neutral nation: It is not to equip a privateer. For violation of this provision in the case of the Confederate cruiser *Alabama*, Great Britain was mulcted by arbitration in an enormous fine. It is not to allow war-vessels of the belligerents to remain in its ports more than 24 hours, except in stormy weather. It shall not be a market for prizes of war. It may not trade with either belligerent in contraband articles. It is not to be a recruiting ground for either belligerent, although it cannot be held responsible for the action of individuals in enlisting separately and on their own responsibility. But a neutral state has definite rights, as these: Its territory is not to be invaded by either belligerent. No battle is to be fought in its home waters. Troops are not to cross the territory of the neutral state. Neutral nations often proclaim the conduct which they propose to adopt at the outset of any war, chiefly to show their own citizens how far they will be protected by their own government in trading with the belligerents. A neutral vessel may trade freely except in articles contraband-of-war or in violation of a blockade. The orders of the English and

French governments during the Napoleonic War, that the whole coast of their opponents should be regarded as in a state of blockade, violated the rights of neutrals in a way that would not at the present time be tolerated.

Ne'va, a northern Russian river; rising in the southwestern corner of Lake Ladoga, it passes through Petrograd and then empties into the Bay of Cronstadt in the Gulf of Finland. It drains Lakes Ladoga, Onega, Ilmen and others. Its total length is 40 miles and the width varies from 180 to 4,000 feet. It is frozen about five months in the year.

Neva'da, one of the Pacific states of the United States, lies between Idaho and Oregon on the north, Utah and Arizona on the east and California on the south and west. It is 500 miles long and 300 wide between its farthest points. Although the sixth largest of the states and territories, it has the smallest population—108,736. Its land surface has an area of 110,700 square miles, that is, almost twice that of Illinois.

Surface and Drainage. The largest part of the state is included in the Great Basin or what at one time was the bed of a large inland sea. This part is dry and barren, with the exception of the regions immediately around Walker, Humboldt, Carson, Pyramid, Tahoe and other lakes, and is traversed by high mountains. The mean elevation is about 4,000 feet. Wheeler Peak, the highest point in the state, has an altitude of 13,058 feet. Of the lakes Pyramid is the largest, being 35 miles long and ten wide, and Lake Tahoe has an altitude of 6,225 feet, is 21 miles long, and is an objective point for many tourists. The principal river is the Humboldt, which rises in the northeast and flows into Humboldt Lake; it is about 375 miles long.

Climate and Agriculture. The dry atmosphere is clear in winter, but in summer is filled with small particles of alkaline dust. The rainfall is exceedingly light, therefore the vegetation is very scanty though hardy. The soil, however, has proven fertile whereever irrigation has taken place, and the results have been surprising. The national government's Truckee-Carson system irrigates 160,000 acres. (See IRRIGATION). Barley, oats, spring wheat, potatoes and vegetables are grown, as well as pears, applies and cherries in the cultivated sections. Stockraising is quite an extensive industry, for the hay-crop, the abundance of prairie-grass and the white sage-brush furnish food-stuffs for the entire year. Angora and Kashmir goats are raised to some extent.

Natural Resources. Fir, spruce and pine grow to a great size; mountain mahogany is found on the foothills; so are willow, beech, cottonwood, wild cherry and dwarf cedar. Among the building-stones are marble, granite, limestone, sandstone and agate. Amethyst, tourmalines and carnelians have been found. There are deposits of sulphur, gypsum, salt, borax, lead, copper, nickel, antimony, coal and mercury, but the gold and silver deposits lead all minerals. The famous Comstock Lode, discovered in 1859, produced $306,000,000 during its first twenty years. Of recent years the discovery and operation of new goldmines at Goldfield, Tonopah, Rawhide and other places have given new impetus to mining with a consequent growth of urban population in the mining regions of the state.

Industries. The leading industries are mining and smelting, but the manufacturing interests include flour and grist mills, railroad-cars, wagons, carriages, dairy-products, boots, shoes, salt and other articles.

Education. The public schools are supported by state and local taxes; high schools as well as grammar schools are maintained in the larger towns; and education is compulsory. An Indian school is maintained by the Federal government at Carson City. The University of Nevada is at Reno, and in connection with this school the government has established an agricultural experiment-station. The state Orphans' Home is at Carson; a hospital for the weak-minded, at Reno, a state penitentiary at Carson and also a government mint.

History. The state was separated from Utah in 1861, and admitted as a state in 1864. The first white men to visit it were the Franciscan friars in 1775. In 1825 Peter Ogden of the Hudson Bay Company came to Humboldt River, Fremont went through the state in 1843–5, and in 1849 a trading-post was established on the Carson River by the Mormons. The principal cities are Carson City, the capital (Pop. 2,466), Virginia City, Reno, Gold Hill, Goldfield, Rawhide and Tonopah. About 5,216 Indians are still on the reservations in the state. Nevada has about 1,000 miles of railroad. The Southern (formerly Central) Pacific connects it with Salt Lake City and San Francisco, the San Pedro with Los Angeles, and there are other important railroads traversing the state.

New Al'bany, Ind., an important manufacturing city, county-seat of Floyd County, is on the Ohio, nearly opposite Louisville. It has extensive rolling mills, two stove-foundries, three large machine-shops, two extensive boiler-works, four tanneries, three furniture-manufactories, two veneer-mills, a box and basket factory, a mosaic-flooring company, a hosiery-mill, cotton and woolen mills, a handle-factory, a clothing-factory and smaller industries. It has three electric interurban lines, five main line railroads and splendid shipping facilities are furnished by river. New Albany has many good public buildings, a library and excellent public schools.

By the annexation of outlying villages, the population has increased to 25,000.

New Bed'ford, a city and port of entry in Massachusetts, is in Bristol County, on the Acushnet estuary, 56 miles south of Boston. For a century prior to 1854 it was the principal whaling-center of the world, sending out over 400 vessels and receiving 60,000 barrels of sperm and 120,000 of whale oil annually. Since that year, however, manufactures have claimed its attention, and it now contains cotton mills of 3 million spindles, foundries, oil refineries, drill, cordage, boot, shoe, flour, glass and plated ware factories. New Bedford's cotton goods are the finest cotton goods made in the United States. New Bedford has many handsome private residences, and numerous prominent buildings, as the Masonic and Odd Fellows' building, Merchant's national bank, Saint Mary's Home for the Aged and Orphans, and the state armory. The educational institutions are Swain Free School, a state textile school, 32 public schools, five parish and one kindergarten (R. C.) school and a public library of 74,000 volumes. Population, 140,000.

New Bright'on, a village and beach resort of New York, is on Staten Island, six miles from Manhattan Island, and for the most part consists of residences of New York's business men, and it contains, besides, many beautiful summer homes. It has commercial interests, such as extensive plaster mills, a paper factory and a dye works. New Brighton has graded schools, Curtis high school (public), Staten Island Academy, beautiful churches and a retreat for sailors known as the Sailor's Snug Harbor. It is connected with Manhattan Borough by the Municipal ferry of greater New York, of which it is a part.

New Brit'ain, a manufacturing town of Connecticut, in Hartford County, has a large park and contains the state armory and normal school. The city has manufactories of hardware, cutlery, locks, hosiery, jewelry, knit goods and machine-shop products. The city has fine churches, good public and parish schools, and is the seat of the state normal school and the New Britain Institute. Water is supplied from a reservoir of nearly 200 acres. Population 70,000.

New Bruns'wick, a province of the Dominion of Canada, is a square, bounded on the south by the Bay of Fundy and an isthmus connecting it with Nova Scotia; on the east by the Gulf of St. Lawrence; on the north by the Bay of Chaleurs and Quebec; and on the west by Maine in the United States. It has an area of 27,500 square miles, little less than that of either Scotland or Ireland, and more than twice the size of Belgium. The proportion of land cultivable is much higher in New Brunswick than in Scotland, and about as high as in Ireland. The population is 351,815—largely Englishspeaking, although many Acadians are settled in the northern counties, lending a picturesque variety to the people. In origin there are three and one half times as many British as French. The Roman Catholic church leads in numbers, the Baptist churches next. The larger share of the population is agricultural, and generally owns its own farms. There is still a vast wealth of forestland. The three principal rivers are the St. John, the Miramichi and the Restigouche. A curious fact is that the headwaters of these three great rivers lie near to each other and the Indians in former days, as the sportsmen in our day, were thus able to pass easily from one to the other, securing thereby a highway to nearly every part of the province. A province so nearly surrounded by water and having such an excellent river system of course has splendid inland and coast navigation. Steamers run to Portland, Boston, Quebec and other ports

The forests are regarded as inexhaustible. Black spruce, the best commercial wood, is largely exported. The province is noted for its game. Moose, caribou and deer are abundant. Its fisheries are among its greatest sources of wealth. The herring is the great commercial fish, though lobsters, smelts and salmon abound. One fifth of the fish caught in Canada are taken in New Brunswick waters by New Brunswick fishermen. St. John, Fredericton and Moncton are its chief cities. The schools receive a grant from the provincial treasury; the rest of their cost being defrayed by local taxation. The provincial university at Fredericton (the capital) also receives a provincial grant and revenues from university lands.

New Brunswick, county seat of Middlesex County, N. J., lies on Raritan River at the head of the Delaware and Raritan Canal. It contains many churches and Rutgers College, founded in 1766, observatory, agricultural college and model farm. It manufactures india-rubber, lamps and needles, wall paper, bandages and surgical supplies and has iron and brass foundries. Population, 36,000.

New Cal'edo'nia, an island in the southern Pacific belonging to France, lies between the Fiji Islands and the eastern coast of Queensland. It is about 240 miles long and 25 wide and has an area, with its dependencies, of 8,100 square miles. The ground is much broken by irregular mountain chains, but in the valleys it is fruitful, yielding cocoanut, maize, tobacco and similar products. It has rich mineral resources in copper, cobalt, antimony and chrome, and exports these, together with preserved meats, copra and coffee to England, while it imports wines, flour, drapery, groceries, machinery and coal. The annual value of its exports in a single year was

11 million francs. It has a population of 53,350, of whom 30,650 are native Kanakas.

Newcastle, Pa., a manufacturing city located on Shenango River, 50 miles northwest of Pittsburg. The production of steel is the principal industry. Large blast furnaces, rolling mills, tin plate, wire and nail mills furnish employment for thousands of workmen. Glass, brick and paper are also manufactured. Population 50,000.

New Guinea or **Papua** (*pä′po͞o·ä*), the second largest island in the world, lies 80 miles northeast of Queensland, Australia, at the southwest of the Pacific Ocean. Its length is 1490 miles, its greatest breadth 410, its estimated area over 312,000 square miles. Its population is estimated as 1,200,000. It was discovered by Abreu of Portugal in 1501, and has been visited repeatedly ever since. Naturalists were the first to explore the interior, Wallace being the pioneer in 1858, and doing world-famous work. Missionaries came next, and five Protestant and Roman Catholic societies are in the field. The Dutch were the first to colonize (1827), the Germans proclaimed a protectorate in 1884, and Great Britain, made annexations in 1885. Dutch New Guinea is the part of the island west of 141° E. long, and covers 151,789 square miles, and has about 700,000 native inhabitants. German New Guinea or Kaiser Wilhelm's Land, the northern half of the eastern region, was taken by the British Colonial forces in 1914, as were Germany's possessions in South Africa. British New Guinea proper, or the Territory of Papua consists of the southeastern portion of the island, with an area of 90,540 square miles and a population of 500,000 natives. The Australian commonwealth took control in 1901. The Dutch have done little for their territory; but the Germans developed theirs through a company, though the imperial government administers public affairs; and the Australians have reduced many districts of the Territory of Papua to order and made tribes in large areas settle down to industry.

New Guinea is irregular in shape, consisting of a broad center from which a narrow peninsula runs southeastward and another to the northwest. The coasts are mostly lofty, but parts of the western shore are marshy flats covered with dense forests. The outline is broken by many indentations, but good harbors are rare. Mountain-ranges traverse the island, Mt. Owen Stanley in the southeast rising 13,205 feet, while in the northwest there are heights of over 20,000 feet, covered with perpetual snow, and active volcanoes. There are four or five large rivers. The animals, except a native pig and native mice, are marsupials and monotremes. Birds abound in amazing profusion and variety. The forests are filled with enormous trees, including the camphor. Bananas, cocoanuts, maize, rice, sago, sugarcane and yams are cultivated. The chief exports are coffee, copra, gold, pearls and pearl-shells, sandalwood and trepang. The bulk of the natives are Papuans, who are not unlike the Negroes of African Guinea, but Malay settlements are numerous on the western coast. The Papuans mainly are at a low stage of culture. Some are fierce and untractable, others friendly in disposition. See AUSTRALIA and BRITISH NEW GUINEA.

New Hamp′shire, one of the original 13 states. forming part of the New England group, is situated south of Quebec, Canada, and is bounded on the east by Maine, on the west by the Connecticut River (which separates it from Vermont) and on the south by Massachusetts. Its length is 185 miles, its breadth 90 miles, and its area 9,305 square miles. The capital is Concord. The other large cities are Manchester, Nashua, Dover and Portsmouth, all important commercial centers.

Surface and Climate. The state is mountainous in parts, the White Mountains in the east-central region, being the most conspicuous and well-known elevations, soared over by Mt. Washington, with an altitude of 6,293 feet. Other elevated peaks occur in the northern and southwestern parts of the state; in the latter are Mt. Monadnock (3,186 feet) and Mt. Kearsarge (2,943 feet); while traversing the state lengthwise is the extreme eastern extension of the Appalachian chain. The drainage is effected by the Connecticut, Merrimac, Androscoggin, Saco, Pemigewasset, Winnepesaukee and Piscataqua Rivers; the chief lakes being Winnepesaukee, Umbagog, Squam, Sunapee and New-Found Lakes. The state has a humid climate, with an abundant rainfall, especially in the mountain regions; while the winters are usually long and severe, save in the delightful and healthy valleys, economically useful for agricultural operations and desirable as residential districts.

Natural Resources. The state is interesting to the geologist, and, though denuded of its original forest, is rich in granite quarries and has considerable mica deposits. The rivers, moreover, furnish an abundant waterpower, taken advantage of by the manufacturing establishments; while wood-pulp in quantities is still available, derived chiefly from the new growth of timber. New Hampshire has a narrow sea-front, but sufficient, with its interior rivers and lakes, to give it some fishery interests — the principal catch embracing cod, mackerel, haddock, lobster and clams. The value, annually, of the timber and lumber products is to-day about 10 million dollars.

Agriculture and Stockraising. The area available for farming is comparatively limited. The region of the chief farms is the coast and the interior valleys, a total area of not more than 3,250,000 acres, and that utilized chiefly for garden products and fruit (especially apple) cultivation. The yield of hay is considerable, as are the forage crops; while much attention is given to dairying and to raising cattle, sheep, swine and horses.

Manufactures. The growth of these has been phenomenal, as one may realize by a visit to such centers of industry as Manchester, Nashua, Dover, Concord, Laconia, Keene and Portsmouth, one or other of these towns being the seat of establishments which turn out cotton goods, woolens, hosiery and knitted goods, boots and shoes, not to speak of the tanning trade, flour and grist mill output, foundry, machine. lumber, timber and paper products and the factory products of cheese, butter and condensed milk. The development and importance of New Hampshire as a manufacturing state is in a large measure due to its abundant and steady supply of water for power purposes; a condition which is, in turn, the result of the heavy rainfalls in the elevated regions of the central and northern portions of the state and the multitude of lakes and ponds which feed the Merrimac and other rivers. Owing to the comparative sterility of the soil and the earnings of industrial employment, the number of inhabitants engaged in farming has decreased and of those engaged in the industries has steadily increased.

Commerce, Finance and Transportation. The railways of the state are owned by the Boston and Maine, with the exception of the Grand Trunk, which runs through the northern part. The banking business is handled by 57 national, nine state and 60 savings banks, with a total capital of six millions, and combined deposits close upon 75 millions. The indebtedness of the state is very small in proportion to the assessed valuation of the property, which amounts to $225,000,000.

Education. There are 2,096 elementary schools with a total school population of 75,385. an enrolled attendance of 54,966 and an average attendance of 50,101. Besides these there were 65 high schools with 278 teachers and 6,136 pupils. The school expenditure for the year amounted to 1,619,505. Higher education is represented by Dartmouth College, at Hanover (*q. v.*), a nonsectarian institution having 118 instructors and 1,229 students; St. Anselm's College (R. C.) at Manchester with 17 instructors and 135 students; the state normal school at Plymouth (for teachers); New Hampshire College of Agriculture and Mechanic Arts at Durham, besides academies and private schools for boys at Exeter and Concord and asylums and charitable organizations for the indigent and afflicted.

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that utilized chiefly for garden products and fruit (especially apple) cultivation. The yield of hay is considerable, as are the forage crops; while much attention is given to dairying and to raising cattle, sheep, swine and horses.

Manufactures. The growth of these has been phenomenal, as one may realize by a visit to such centers of industry as Manchester, Nashua, Dover, Concord, Laconia, Keene and Portsmouth, one or other of these towns being the seat of establishments which turn out cotton goods, woolens, hosiery and knitted goods, boots and shoes, not to speak of the tanning trade, flour and grist mill output, foundry, machine, lumber, timber and paper products and the factory products of cheese, butter and condensed milk. The development and importance of New Hampshire as a manufacturing state is in a large measure due to its abundant and steady supply of water for power purposes; a condition which is, in turn, the result of the heavy rainfalls in the elevated regions of the central and northern portions of the state and the multitude of lakes and ponds which feed the Merrimac and other rivers. Owing to the comparative sterility of the soil and the earnings of industrial employment, the number of inhabitants engaged in farming has decreased and of those engaged in the industries has steadily increased.

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In 1930 there were 25,378 farms in New Jersey covering 1,758,027 acres, with 987,000 acres devoted to the cultivation of crops. The principal crops of 1931 were potatoes, 7,155,000 bushels; corn, 6,930,000 bushels, and hay, 318,000 short tons. In 1931 there were 136,000 milch cows; 67,000 other cattle; 35,000 horses; 78,000 hogs and 7,000 sheep. The value of the farm lands and buildings amounted to $289,845,000 in 1930, and the gross income the following year from the farm products was $36,198,000, and $41,519,000 from live stock.

Fruits are grown extensively, the cranberry marshes yielding 142,000 barrels in 1931, and 80,000 barrels in 1932. New Jersey is one of the leading states in the production of this fruit. There were raised 678,000 crates of strawberries from 6,000 acres in 1932. The peach crop in 1931 amounted to 2,230,000 bushels and 1,776,000 bushels in 1932. The apple crop also showed an increase in 1932 over the previous year, 1932 supplied 3,640,000 bushels and 1931, 3,400,000 bushels were harvested.

New Jersey is one of the leading Middle Atlantic states in fisheries, the shell fish being the most profitable and most extensive. Large catches of clams, oysters, sea bass, cod, shad, menhaden, and sturgeon are taken annually on the Delaware River and Bay and along the sea coast. The inland streams and lakes are well stocked with trout, perch, bass, crappie, pickerel and pike, and the Delaware River has been stocked with black bass by the United States Fish Commission.

At one time, New Jersey was heavily wooded. The northern forests were chiefly of hard woods such as hickory, oak, maple, beech, ash, tulip, poplar, pine, hemlock and cedar; while the southern part produced yellow pine and white cedar from the swamps. The virgin forests have all been cut over once, but the second growth is growing in value and with the State protection which the forests now receive, the lumber industry is bound to develop in New Jersey. The State reserves cover 10,000 acres of the 2,000,000 acres of woodland. More than 230,000,000 board feet of lumber are cut annually.

New Jersey is principally a manufacturing State, ranking very high in the gross value of commodities produced. Geographically the State is situated between two of the largest cities of the country, New York City and Philadelphia. It has extensive water navigation with the long extent of the Atlantic Ocean on the east and the Delaware River and Bay on the west, beside the valuable facilities of New York Harbor of easy access. Combined with the abundant coal fields of Pennsylvania to the west and the extensive steam and electric railways connecting all industrial centers, these factors add materially to the growth of this manufacturing State. Petroleum refining is the leading industry with ten refineries having an output in 1929, valued at $297,151,470, and copper smelting from three plants the same year were valued at $302,546,434. Textile industries which include silk, woolen, felt, cotton, linen goods, carpets and rugs rank third with a valuation of $163,967,060. Paterson is the leading silk manufacturing center in the United States. Other manufactures include linoleum, pottery, sewing machines, chemical products, rubber products, electrical machinery and supplies, soap, toilet articles, jewelry, wire works, leather goods, paints and varnish. In 1929 there were 8,364 manufacturing establishments in the State, employing 441,105 wage earners who produced an output valued at $3,937,656,019. Materials, power and fuel used in these plants were valued at $2,128,167,537 and the wages amounted to $628,097,520.

Several cities in New Jersey supply the wholesale markets of New York and Philadelphia so extensively with one particular commodity, that they are known in the Metropolitan area of the East for their outstanding industry. Camden is noted for chemicals, Passaic for woolens, Elizabeth for sewing machines, Trenton for pottery, Jersey City for tobacco and soap, Paterson for silks, Newark for leather and New Brunswick for hosiery.

Transportation. The steam and electric railway facilities are highly developed in New Jersey, particularly in the north where all lines enter New York City, and in the west where Camden and Philadelphia are the great terminals. Among the leading roads forming a network of tracks across the State are: the Pennsylvania; the Delaware, Lackawanna and Western; the Central of New Jersey; the Lehigh Valley and the Erie, all of which have terminals at Hoboken, or Jersey City; and the Seashore Railway and the West Jersey which serve the southern end of the State. There were 2,284 miles of steam railroads in New Jersey in 1932; 1,093 miles of electric railroads, and 174 miles of canals. Two canals of great importance in the carrying of coal to the industrial centers are the Morris Canal, 101 miles in length, which connects Jersey City with Phillipsburg; and the Delaware and Raritan Canal, sixty-five miles in length, which connects New Brunswick with Bordentown and Lambertville. The ports for two of the trans-Atlantic steamship lines, the Hamburg-American and North German Lloyd Companies, are on the Jersey side of New York Harbor. The transcontinental motor road, the Lincoln Highway, extends across New Jersey for 106 miles. A network of roads covers New Jersey with 1,877 miles maintained by the State, of which 1,680 miles are hard surfaced.

Small vessels follow the coast line, in the countless inlets along the shore and to considerable distance up the rivers, calling daily at thousands of piers for milk, butter, cheese, flowers, fruit and fresh vegetables to supply the city markets. Suburban trains also collect agricultural produce from the small country stations.

Many New Jersey residents engage in business in New York City and commute daily. Excellent suburban service is supplied by all the railroads, as well as electric lines, and the system of ferry boats transporting thousands of people across the Hudson River.

Population. The United States census of 1930 gives New Jersey a population of 4,041,334 inhabitants, an increase of 28.1 per cent over that of 1920. Of this total, 82.6 per cent live in the cities and towns. The State is well populated with foreign-born whites, amounting to approximately twenty-one per cent of the total. The Negroes form 5.2 per cent of the population, numbering 212,125 inhabitants. The chief cities, with their populations in 1930, are: Newark, 442,337; Jersey City, 316,715; Paterson, 138,513; Trenton, the capital, 123,356; Camden, 118,700; Elizabeth, 114,589; Bayonne, 88,979; East Orange, 68,020; Atlantic City, 66,198; Passaic, 62,959, and Hoboken, 59,261.

Education. The State expenditure for public schools in 1930-1 amounted to $19,518,578 and was chiefly expended on new buildings, maintenance and teachers' salaries. The system is directed by a State Commissioner of Education and four assistants, appointed by him for a term of five years, and by a State Board of Education appointed for eight years. Twenty-one county superintendents who serve three-year terms are appointed by the State Commissioner and approved by the State Board. Compulsory education for children between the ages of seven and sixteen years is enforced, and the public schools are opened to all between the ages of five and twenty years. Illiteracy in 1930 amounted to 2.7 per cent of the population over ten years of age. In 1931 there were 1,933 schools with an enrollment of 59,732 pupils and 2,241 teachers, and ninety high schools with an enrollment of 15,353 pupils and 928 teachers. The State conducts four normal schools at Trenton, Glassboro, Montclair and Newark, and four industrial schools. The schools are supported by a State educational fund, and by State, local and railroad taxes.

Princeton University is the outstanding institution for higher education in New Jersey. It was founded in 1746 as the College of New Jersey, and under the control of the Presbyterian Church was opened at Elizabethtown. In 1747 Aaron Burr became president and the school was moved to Newark. Not until 1756 was it transferred to its present site where the first building had been erected and named Nassau Hall. This is famous in American Revolutionary War lore as headquarters for General George Washington's Army. In 1783 Congress was forced to retire to Princeton and for a short time the Capitol was housed in Nassau Hall. The University has been the Alma Mater of many of our famous and prominent Americans. In 1933, 2,597 men were enrolled under a faculty of 313.

Rutgers College at New Brunswick was chartered in 1766 as Queen's College and rechartered four years later with a few changes. During the Revolutionary War the British occupied New Brunswick; classes were held at North Branch and Millstone. In 1808, the present site of this college was procured. In 1825 following a donation from Colonel Henry Rutgers of New York, the present name was given the college. By an act of the Legislature in 1917 it was made the State University. The following year New Jersey College for Women was organized and affiliated with Rutgers.

The College for Men, in 1933, had an enrollment of 1,219 students with a faculty of 309 members, and the College for Women had an enrollment of 1,071 students with a faculty of 103 members.

Other noteworthy colleges are Stevens Institute of Technology at Hoboken with 504 students in 1933; Seton Hall College at South Orange with 282 students; Saint Peter's College (Roman Catholic) at Jersey City with 275 students; Saint Benedict's College (Roman Catholic) at Newark. Two prominent theological seminaries are located in New Jersey, Drew Theological Seminary at Madison with 350 students, and Princeton Theological Seminary affiliated with the University.

Government. The Constitution by which New Jersey is now governed was originally adopted in 1844, and amended in 1877 and 1897. The State Legislature provides that amendments may not be submitted oftener than every five years. An amendment may be proposed in either house, to be approved by a majority vote of both branches of the legislature in two consecutive sessions, and afterward voted upon by the people at a special election.

The legislative body consists of a Senate and a General Assembly. The Senate is composed of twenty-one members representing each county. They are elected to serve three years, and one-third of the members are chosen annually. The General Assembly is composed of sixty members who are elected annually. The State is subdivided into counties, cities, towns, boroughs, and townships.

The executive body consists of a Governor elected for a three-year term by the people, and not eligible for re-election; a Treasurer and Comptroller elected by the legislature, and a Secretary of State, Attorney-General, Prosecutors of Pleas, Clerks of Court and Boards of Commissioners, appointed by the Governor and Senate for a term of five years.

The judicial body comprises a Supreme Court, with a Chief Justice and eight associate justices, appointed by the Governor for seven years with the advice of the Senate; a Court of Errors and Appeals, consisting of a chancellor and six judges; a Court of Chancery, Prerogative Court, Orphans' Court, Circuit Courts, County Courts and justices of the peace.

The State of New Jersey is represented in the National Congress by two Senators and fourteen Representatives.

History. The first white man to visit the shores of New Jersey was Giovanni da Verrazano, a Florentine Navigator, in 1524. During the next year, the Spaniard Gomez visited the territory. Henry Hudson, the English navigator, explored the region between Sandy Hook and Raritan Bay in 1608, and in 1617 settlements were made by the Danes at Bergen. The Dutch and Swedes made settlements several years later, the former near New York and the latter in the southern part near Delaware. The first permanent settlement was established by a Dutchman, Van Putten, in 1640 at Haboconhackingh, the present site of Hoboken. Following the expedition of Governor Peter Stuyvesant in 1655, Dutch control was established, and by 1664 the entire region passed under English dominion to the Duke of York who granted it by deed to Lord John Berkeley and George Carteret. A government by popular assembly was established. In 1676 the territory was divided by a line running from Little Egg Harbor to a point near Delaware Water Gap, into East Jersey, under the jurisdiction of Carteret, and West Jersey which was assigned to Quaker proprietors. By 1702 all rights were ceded to the crown which made New Jersey a royal province. It came under the control of the New York Governor, but with a separate legislative body. It was not until 1738 that a separate Governor was appointed. Many Scotch-Irish and Huguenots immigrated to New Jersey so that by the opening of the Revolutionary War the colony was predominately Presbyterian and whole heartedly supported the colonial cause, although the Governor William Franklin, a son of Benjamin Franklin, was a Tory sympathizer. He escaped to New York City where he aided the British army with information and advice. Many of the battles of the Revolutionary War were fought within the boundaries of New Jersey, the most important ones being those of Trenton on December 26, 1776; Princeton on January 3, 1777; and Monmouth on June 28, 1778. Washington's Army spent two winters at Morristown. The first constitution of the State was ratified in 1787. New Jersey was the third State to ratify the Federal Constitution. A new State constitution was adopted in 1844, which was entirely revised in 1875 and has been amended from time to time since then.

New Jersey was a strong adherent to the Union cause during the Civil War, supplying 88,305 men and $3,000,000 to help finance it. However, the State Constitution was not amended to legalize negro sufferage until 1875. A monopoly of the Camden and Amboy Railroad Company had existed for many years but was finally broken by a general railroad law which was passed in 1873. This opened the State to a general and rapid development of railways. The Legislature passed laws in 1883 regulating the labor of women and children in the factories and mines, and the following year a law enforcing compulsory education was passed. Within the next decade sufficient pressure was brought to bear against gambling at race tracks to force the Legislature to enact a law against it. In 1907, a law was passed permitting electrocution in place of hanging as a means of capital punishment. After the State Board of Health had declared tuberculosis an infectious disease in 1907, a tuberculosis sanitarium was established to care for patients suffering from the disease. Two laws of importance were passed the following year, namely, the direct primary law and an employers' liability law. In 1910 the public utilities law was passed and put into operation, under the supervision of a newly created commission.

Governor Woodrow Wilson of New Jersey was nominated on the Democratic ticket for President of the United States in July, 1912. He was elected in November of the following year and reëlected a second term in 1916. It was during his administration that the United States entered the World War. New Jersey was most liberal in its support.

New Liskeard, the capital and the commercial center of the Nipissing district in Ontario, Canada, is situated at the head of Lake Temiskamig, 340 miles from Toronto. It is connected by rail with Toronto, and has lake steamer service also. It is the door to the rich lands of Temiskamig Valley. The saw mills are the most important industry. Other industrial activities include government creameries, brick kilns, flour and grist mills and foundries. The population in 1931 was 2,880.

New London, a seaport and one of the seats of New London County, Connecticut, is situated on the right bank of the Thames River, three miles from its mouth. Among its notable buildings are the Court House, City Hall, Customhouse, and nine beautiful school buildings. The harbor is excellent, with a pier at which large ocean liners can dock. The United States maintains a submarine base and the Coast Guard Academy at New London. It is also the seat of the Connecticut College for Women. Sealing and fishing are important industries. In the old whaling days it sent out 300 ships annually. The principal industries include manufacture of woolens, silks, agricultural machinery, hardware, cotton-gins, printing presses, boilers, hot-water and steam-heating apparatus, and crackers.

The city was settled in 1646 by John Winthrop, first Governor of Connecticut. In 1871 it was burned by Benedict Arnold. The port was blockaded during the War of 1812. Its ocean beach is now a popular Sunday and holiday resort, and the annual Yale-Harvard regatta is held on the Thames River at New London. The population in 1930 was 29,640.

New Mex'ico. A state located in the southwestern part of the United States. It lies south of Colorado, west of Oklahoma and Texas, north of Texas and Mexico and east of Arizona. The state is nearly square, and contains 122,580 square miles. It is nearly equal in size to Pennsylvania, New York and Maine combined. It was admitted as a state Jan. 6, 1912.

Surface. The state is traversed by the southern end of the eastern range of the Rocky Mountain system. Hence the surface is very irregular —a great plateau from 4,000 feet to 8,000 feet high, cut by river-valleys, canyons, mountain-ranges and peaks. The continental divide passes irregularly north and south through the middle of the western half of the state; hence nearly all of the drainage is into the Gulf of Mexico by means of the Canadian River, the Pecos River and the Rio Grande; a very small portion of the western part drains into the Gulf of California through the San Juan, Little Colorado and Gila Rivers, tributaries of the Colorado. The principal mountain-ranges are the Raton, the Culebra and the Jemez of the north; and the Sacramento, the San Andreas and the Black of the south; all of which have a north-and-south trend. Many peaks reach 9,000 to 12,000 feet. The striking features of the landscape are the large *mesas* or tablelands, many capped with lava.

History. The ruins of numerous communal houses built in great caves in lava formations or on the tops of isolated *mesas* bear evidences of a prehistoric people that was well-advanced in building, weaving and the manufacture of earthenware. This prehistoric people understood irrigation and agriculture. The Spaniards who first settled in Mexico made expeditions into New Mexico early in the 16th century, and found many prosperous Indian villages, called *pueblos.* In 1598 Oñate founded a colony near San Juan on the upper Rio Grande and became the first governor. In 1582 Espejo settled at Santa Fé, the second oldest permanent white settlement in the United States. For nearly 100 years the king of Spain controlled New Mexico through his governors, but in 1680 there was a general revolt of the Indians and all foreigners were killed or driven out. Twelve years later (1692) Vargas reconquered the territory, and it remained a province of Mexico until 1846, when it was taken by General Kearny in the war between the United States and Mexico and was ceded to the United States on May 30, 1848, by the Treaty of Guadalupe Hidalgo. That portion of New Mexico which lies south of 32° N. was purchased from Mexico in 1853 under the Gadsden Purchase.

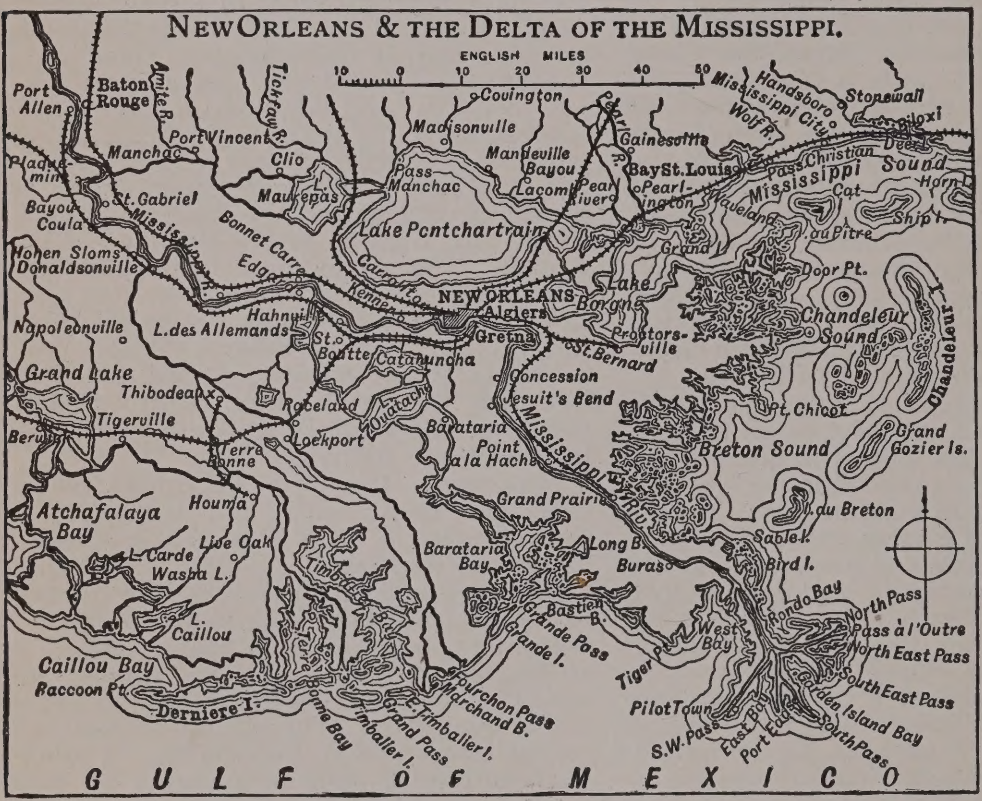
Inhabitants. The total population is 416,966; nearly half of whom are Spanish, and about 40,000 are Indians. Thousands of land entries have, however, been made, and all by English-speaking people; the percentage of native inhabitants therefore is constantly on the decrease.

Climate. New Mexico has an exceedingly healthful climate, and is known as the Land of Sunshine, having 250 days of sunshine in a year. The mean annual temperature of the principal cities ranges from 50° to 55°, which is regarded as ideal. The rainfall is very light, averaging about 12 inches. The territory is a mecca for hundreds of tuberculous patients who enter it yearly and receive great benefit. Wind velocity is often high, but tornadoes are unknown.

Education. The public-school system was organized in 1891. Since then educational advantages have grown rapidly. The state board of education through its secretary, the state superintendent of public instruction, has general supervision over the public schools, and in each county there is a county superintendent. More than 56,000 children are enrolled in the public schools and 1,500 teachers employed. City schools are excellent; rural schools inferior, but gradually improving. Spanish is the prevailing language in the mountainous districts, but English is the language of the schools. The educational institutions are located as follows: University of New Mexico, Albuquerque; Normal University, East Las Vegas; Normal School, Silver City; School of Mines, Socorro; Agricultural College, Las Cruces; Military Institute, Roswell; School for the Deaf, Santa Fé; School for the Blind, Alamogordo.

Industries. The most important industries are sheepraising and woolgrowing. Fully 4,000,000 head of sheep are found within the territory. Thousands of head of cattle are raised on the ranges and shipped to the central west. The annual shipment is from 75,000 to 100,000 head. Mining is an important industry. Coal, copper, silver, gold, lead and zinc are mined in considerable quantities. The output of coal and copper comes first in importance. The annual output of lumber amounts to over 100,000,000 feet. The forests are in the highest mountain regions. The largest sawmill and lumber-yard is at Albuquerque. Logs are brought from the Zuñi Mountains, 100 miles distant. Agriculture is an important industry in the large valleys where water may be secured for irrigation. Alfalfa and fruit constitute the most important crops, although kafir corn, maize, millet, wheat, oats, rye, barley and vegetables are raised. In some sections dry farming succeeds in favorable years. Manufacturing is not an important industry, although ice-factories, smelters, woolen mills and sash and door factories are found in the larger cities of the state.

Transportation. The most important railroad is the Atchison, Topeka and Santa Fé which traverses the central portion of New Mexico from north to south and branches west from Albuquerque to the coast. The central portion is therefore connected directly with Denver, Kansas City and Chicago; with El Paso and the City of Mexico; and with Los Angeles and San Francisco. The Rock Island; El Paso and Northeastern; Denver and Rio Grande; and Santa Fé Central are other important roads cutting the territory. Several automobile routes have been established connecting various points of the different railroads, thus saving long distances and much time.


NewOrleans & the Delta of the Mississippi.
English Miles
10 0 10 20 30 40 50
Port Allen
Baton Rouge
Amite R.
Tickfaw R.
Covington
Madisonville
Mandeville
Bayou Lacombe
Pearl River
Bay St. Louis
Pearlington
Mississippi City
Handsboro
Wolf R.
Stonewall
Pass Christian
Mississippi Sound
Cat I.
Horn I.
Ship I.
Manchac
Port Vincent
Clio
Maurepas
Pass Manchac
Lake Pontchartrain
Bayou Goula
St. Gabriel
Mississippi
Bonnet Carre
Hohen Solms
Donaldsonville
Napoleonville
L. des Allemands
Hahnville
Kenner
Carrollton
NEW ORLEANS
Algiers
Gretna
St. Bernard
L. Borgne
Grand Lake
Thibodeaux
Tigerville
Lockport
Barataria
Point a la Hache
Concession
Jesuit's Bend
Terre Bonne
Houma
Atchafalaya Bay
Grand Prairie
Live Oak
Washa L.
L. Caillou
Caillou Bay
Raccoon Pt.
Derniere I.
Barataria Bay
Long B.
Buras
Grande Pass
Grande I.
Marchand B.
Timbalier I.
Tiger
Pilot Town
S.W. Pass
East Pt.
Port Eads
South Pass
Garden Island Bay
South East Pass
North East Pass
Pass à l'Outre
North Pass
Rondo Bay
West Bay
Bird I.
Sable I.
I. du Breton
Breton Sound
Grand Gozier Is.
Pt. Chicot
Chandeleur Sound
Chandeleur
Door Pt.
Pt. au Pitre
GULF OF MEXICO

New Or'leans, the largest city of Louisiana, lies on both sides of the Mississippi about 107 miles from its mouth, and derives its name of Crescent City from the shape that two bends in the river give it. Its situation as the southern outlet makes it the second city in the United States in importance as to exports. It is the terminus of three canals, twelve railroads and three local lines, while over 20 lines of steamships connect it with other ports. Since 1875 New Orleans has made great progress in manufactures, particularly in cotton goods, cotton-seed oil, machinery, lumber, furniture, fertilizers, sugar-refining and rice-milling. New Orleans is built upon ground from two to six feet below the surface of the river, and is protected from the rising waters by levees along the water front. It contains the United States mint, an old Gothic church (a good sample of Creole-Spanish architecture) and a new customhouse, besides the largest charity hospital in the United States. It has good public schools, maintained at an annual cost of $1,200,000, with a teaching force of 1,650 and an attendance of 65,000 pupils. Tulane University, with 400 professors and 3,000 students has under its control Newcomb College for the higher education of girls. There also are the College of the Immaculate Conception and four colleges for negroes. The Howard Memorial, Tulane and Louisiana libraries, all free, contain together 150,000 volumes. The place where the city is built was first visited by Bienville in 1699. He founded the city in 1718, and made it the capital in 1726, which honor it held until 1852 and again during 1865–79. It was ceded to Spain by France, but in 1765 the people established a separate government, only to have the leaders of the movement shot in 1769. It was incorporated as a city in 1804. It was the scene of the battle of New Orleans in 1815, and was captured by Farragut in 1862. The people are of all nations, only 19 per cent. being of American or English descent. Seventeen per cent. are Creoles, a term applied to people born in the southern states of French, Spanish or Portuguese ancestors. The Creole dialects are corruptions of French, Spanish and Portuguese. Mr. Cable's stories revealed to English readers the singularly quaint charm of the phraseology and manners of the Creoles of Louisiana, who are of French descent. Besides the American and Creole inhabitants, the population is made up of Germans, Irish, Italians, Spaniards, Scandinavians, Jews, Negroes, mixed races, Indians, Chinese and Malays. A large international trade is carried through New Orleans; an aggregate tonnage of 17,000,000 tons entering and clearing annually. The value of the imports and exports is $625,000,000 annually, exceeding Baltimore, San Francisco, Boston, etc. Population, 435,000.

New Rochelle (*rō-shĕl'*), **N. Y.**, a town in Westchester County on Echo Bay in Long Island Sound and on the New York, New Haven and Hartford Railroad. Being within 17 miles of Grand Central Station, New York City, many merchants of the great capital make their homes here and find it salubrious and attractive. Its yacht club, rowing club and golf links bring many people for a day's outing from the greater city. It has fine school buildings, beautiful churches, spacious residences, an excellent system of public schools, banks and other adjuncts of a thriving suburban city. The town was settled in 1688 by French Huguenots, some of whom were natives of La Rochelle, from which it received its name. The population in 1930 was 54,000.

New South Wales, the oldest colony in Australia, formerly included Queensland, Victoria, South Australia, Tasmania and New Zealand, but now its area is 309,432 square miles. The Australian Alps, Blue Mountains and Liverpool Range are some of the mountains scattered over the country. The chief rivers include the Murray, Lothian, Nepean, Clarence, Shoalhaven, Darling and Macquarie. The colony was established in 1788 by a party of transported prisoners from England. Then land was given to free colonists, and transportation ceased in 1840. There followed a great social advance, stimulated by the discovery of gold in 1851. The country is covered with trees such as the eucalyptus, palm, pine and cedar, and vegetation is very rich. Kangaroos infest this as well as other regions in Australia; there are many lizards and snakes and birds of beautiful plumage. Gold was first worked in 1851 near Bathhurst, and is now found in an area covering 70,000 square miles to an annual value of nearly $25,000,000. Silver abounds in Barrier Range; copper, tin, bismuth, manganese, antimony, mercury, zinc, cobalt and alum are mined; and precious stones are found in the granite formations. Yet the greatest mineral wealth is found in the coal fields, extending over 24,000 square miles and yielding 8,000,000 tons annually. Sheep and cattle are extensively raised, there being over 50,000,000 sheep now in pasture. The export of wool is nearly 300,000,000 pounds a year. While 140,000,000 acres are devoted to pasturage, only 1,000,000 are given to farming. The agricultural output is very small. In addition to gold, coal and wool, the exports include hides, skins, oranges, citrons, cane-sugar, wine, brandy, leather, tallow and preserved and frozen meat. The colony has the largest trade of any of the Australian colonies. It now has 5,974 miles of railway open for traffic. Public schools maintained by the State are established, entirely unconnected with the church. Higher education is represented by the University of Sydney, with a 1931 staff of 287 professors and lecturers and 3,119 students. The laws are administered by a Governor appointed by the crown, an executive council, a legislative council and legislative assembly. The population of New South Wales in 1932 was 2,529,734. Sydney, the chief city, had a 1931 population of 1,256,230.

New Stars, sometimes called temporary stars, are bodies which suddenly make their appearance in the heavens, rise rapidly to their full brightness, and soon begin to diminish until they can be seen only with a telescope or, perhaps, not at all. The earliest one of which we have any account is that of 1572, generally known as the Star of Tycho Brahe. But it is only since the invention of the spectroscope that this class of stars has come to be of especial interest. The new star in the constellation of Corona Borealis, discovered by Birmingham on May 12, 1866, was examined spectroscopically by Huggins and Miller. They found that it possessed both a dark line spectrum and a bright line spectrum, differing in this respect from nearly all the other stars. The next new star was that in the constellation of the Swan, known as Nova Cygni, discovered on November 24, 1876, a red star of the third magnitude. Two years later it was fainter than the eleventh magnitude. Nova Andromedæ was discovered in August, 1885, and Nova Orionis in December of the same year. The star which Anderson at Edinburgh discovered on January 24, 1892, however, far exceeded all previous new stars in interest, because the power of the spectroscope had been increased in many ways since the previous stars were observed. The next and only other important new star was also discovered by Anderson, this time in the constellation of Perseus, on February 22, 1901. Many theories have been advanced to explain this curious phenomenon, but the one which at present seems most probable is that advanced by Seeliger. He claims that the new star is produced by some dark body rushing into a meteor swarm or a nebula, the impact of small particles being sufficient to bring the dark body to incandescence.

New Year's Day is the first day of the year. It now is usually celebrated by feasting and the interchange of presents. Jews, Chinese, Egyptians and Mohammedans, while differing as to the time of celebration, celebrate the first day of the year in their respective calendars. In the Christian era Christmas day, Easter and the first of March have each in turn been celebrated as New Year's Day and it was not until late in the sixteenth century that the first of January was universally accepted. In Scotland, France and Italy, New Year's Day is of more importance than Christmas, but in other countries the latter has superseded the former as a day of rejoicing and of giving gifts.

New York, the "Empire State," is one of the middle Atlantic States of the United States and one of the most important political, commercial and industrial States of the Union. It is the seaward gateway of the principal immigration and trade of the Old World into the New. New York extends over an area of 49,204 square miles, 1,550 miles of which are water. It is bounded on the north and west by Lake Ontario, Lake Erie, the St. Lawrence and Niagara Rivers, and the Canadian provinces of Quebec and Ontario; on the east by Lake Champlain, Vermont, Massachusetts, Connecticut, and Long Island Sound, and on the south by the Atlantic Ocean, New Jersey, Pennsylvania and New York Bay. On its extreme southwestern corner the lower Hudson River separates the State and New York City from New Jersey.

The State of New York embraces several islands including Manhattan Island, Long Island and Staten Island in the south; Grand, Goat, Cayuga, Tonawanda, Beaver, and Buckhorn in the Niagara River; many of the Thousand Islands in the St. Lawrence River, and Crab, Schuyler, and Valcour Islands in Lake Champlain.

Surface and Drainage. The general contour of the State is hilly and undulating. The loftiest regions are to be found among the Adirondack Mountains and the Catskills. The principal mountain group in the State spreads over the north-northeastern section of New York, the Adirondacks, which occupy an area of 5,000 square miles. The chief peaks of this range are Mount Marcy in Essex County, 5,344 feet, and Algonquin Peak in the same county of 5,112 feet. The Catskills which extend principally over Greene, Ulster, Sullivan and Delaware counties, occupy an area of 1,000 square miles, west of the Hudson River. Amid deep glens, gorges and wooded summits in Ulster County, stately Mount Slide soars to a height of 4,204 feet, and Mount Hunter in Greene County reaches an elevation of 4,025 feet. Washington Irving, in his story, *Rip Van Winkle,* made the region of the Catskills famous.

East of the Hudson River lies the rough plateau region of the State which culminates in Taconic Range, linking the Green Mountains of Vermont and the famous Highlands of the Hudson in southeastern New York and northern New Jersey. The wooded slopes and peaks and rocky precipices of the Highlands of the Hudson are among the most impressive and inspiring spots of beauty in the United States. Here rise the stately and majestic Breakneck and Storm King peaks.

West of the Catskills lies a plateau which rises in two broad terraces and a gentle slope from Lake Ontario. It is in this region where the famous precipitous Toughannock Falls, situated near Cayuga Lake lend their beauty to the scenic features of the Empire State. Near Seneca Lake fall the beautiful cascades of Watkins Glens.

New York abounds in beautiful lakes and rivers. The principal river of the State is the Hudson, which rises in the Adirondacks and after a course of 315 miles in a southerly direction empties into New York Bay and the Atlantic Ocean. The geological history of New York State reaches far back into the Precambrian era, the oldest recognizable in the rocks of the earth. These rocks abound in the Adirondocks and Highlands of the Hudson. The Hudson River is among the most ancient rivers of the North American continent. The course of its waters is over rocks which have been frequently and heavily faulted. It is navigable for about 150 miles from its mouth, as far as Troy. The principal tributary of the Hudson is the Mohawk River which drains the central part of the State and supplies excellent water power for the industries along its course, especially at Cohoes and Little Falls. This river has now been canalized as the New York State Barge Canal. Other important tributaries of the Hudson River are the Esopus and the Wallkill rivers, which, however, are not navigable for large steamboats. Among the other important streams of the Empire State are the Oswego River which flows into Lake Ontario, the Genesee flowing through the western section of the State into Lake Ontario, and the Niagara River. The Oneida River, a tributary of the Oswego, drains eleven navigable lakes of central New York. Southern New York is drained by the Allegheny, the Susquehanna and the Delaware. The principal waterways of the northern part of the Empire State are the Black, the Oswegatchie, the Grass, the Raquette and the Saranac. The great waterway of the St. Lawrence borders the State on the north.

Beautiful lakes abound in New York. One of the most famous of these scenic waters is Lake George, the waters of which empty into Lake Champlain. Myriad lakes spread over the Adirondack region, adding their natural beauty to the wooded summits and deep glens of this section of the State. Many navigable lakes dot the western and central portions of New York which include lakes Otsego, Oneida, Onondaga, Otisco, Skaneateles, Cross, Cayuga, Seneca, Keuka, Canandaigua, Honeoye, Hemlock, Silver, and Conesus. Chautauqua Lake lies in the extreme southwest.

Climate. The climate of New York naturally varies in the different areas of the State. A warm climate prevails in the southern and coastal regions while extreme temperatures are found far inland. The climate here is often termed a continental climate, one which is subject to sudden change, oftentimes extreme, but temporary. Winters in the Adirondacks are most severe. The summer season, however, in the mountains is most delightful. There is an abundant rainfall, heaviest in the north where the winters are usually protracted and severe.

Minerals. The mineral resources of the State consist chiefly in iron ore, zinc, petroleum and natural gas, gypsum and salt. There are no gold, silver, or coal deposits within the confines of New York. Iron ore has been mined and smelted in this region since 1750, and these deposits are still widely distributed. Magnetite is obtained in the Adirondacks and the Highlands of the Hudson. Hematite is found in the Clinton belt of central and western New York, and limonite abounds in Dutchess and Columbia counties.

The greater supply of zinc ore is obtained in St. Lawrence County, although it also occurs in Orange, Ulster and Sullivan counties.

The Empire State leads the Union in the mining and manufacture of gypsum which is being extensively adapted to building purposes. The most important gypsum interests are centered in Erie, Genesee and Monroe counties.

Among the most important quarry stones found in New York are granite and marble in the Adirondacks and Hudson Highlands and limestone and sandstone from other sections of the State. Other important minerals of the State include quartz, garnet, emery, feldspar, pyrite, slate, millstones, gravel, and diatomaceous earth. The talc mines of St. Lawrence County, New York, are the largest in the United States.

Production and Industry. New York has well-developed agricultural interests which have kept pace with the demands of a large urban population. In 1930 there were 159,806 farms in the State comprising 17,979,633 acres, or fifty-nine per cent of the total land area of the State. In 1932 there were 4,028,000 acres of this total devoted to hay crops; 1,056,000 acres to grain for livestock feeding, and 566,000 acres in corn for grain, silage and fodder. New York is noted for the production of an excellent quality of fruits and vegetables. Dairy farming is, however, the most important type of farming engaged in. In 1931 there were 7,367,235,000 pounds of milk produced. The principal crops, with their productions in 1932 are: corn, 20,790,000 bushels; wheat, 3,916,000 bushels; oats, 27,032,000 bushels; hay, 4,914,000 tons, in the production of which New York is the leading State in the Union; apples, 22,197,000 bushels; peaches, 1,663,000 bushels; pears, 1,745,000 bushels; cherries, 25,627 tons, the largest production of this fruit in the United States; grapes, 67,971 tons; cabbage, 299,000 tons; onions, 3,683,000 bushels; potatoes, 28,350,000 bushels, and beams, 855,000 bushels.

Included among the livestock in New York on January 1, 1932, were: 1,411,000 milch cows; 473,000 sheep; 205,000 swine; 303,000 horses; 6,000 mules, and 14,560,000 chickens.

In the field of manufacturing, the State of New York ranks first among the states of the Union. In 1929 there were 39,395 manufacturing establishments in the State, in which 1,105,966 wage-earners were employed. The value of the products turned out by these workers was returned as $9,978,556,143. On July 31, 1932, there were 543,440 active spindles in New York State which consumed 69,685 bales of cotton. The leading manufacture of the State in 1931 was the production of women's clothing. The second largest industry consists in newspaper and periodical printing and publishing. In 1931 there were 2,115 publications in the State, of which 192 were dailies, 861 weekly, and 801 monthly. These periodicals were published in English, but the remaining publications represent practically every foreign tongue. The output of the printing and publishing in 1931 from 843 establishments was valued at $322,603,666. A large volume of the State's manufacturing is credited to New York City, the metropolis of the State. Outside of this area certain localities, aided by an abundance of water power, have devoted their attention to and developed special lines of manufacturing. Troy, for instance, is noted for its manufactures of shirts, collars, and cuffs. Gloversville is famous for its glove manufactures, Yonkers for its carpets, and Brooklyn for its peat, sugar-refineries, foundries and machine shops. Buffalo is the greatest grain distributing point in the United States, and the leading flour milling center of the world.

Transportation. With its ocean and lake ports, canal and vast railway and airline facilities, the commerce of New York State is of stupendous and steadily growing volume, both local and foreign. New York Harbor is the leading port in the world. In 1932 the net registered tonnage of vessels in the foreign trade entering this port was 26,647,000. There are approximately 800 miles of navigable ocean, lake, and river waterways in New York State, a region which is penetrated by the New York State Barge Canal (Erie). The commerce passing through this canal and the ports of Buffalo, and Oswego, totalled 3,643,433 tons in 1932. At the close of the fiscal year, June 30, 1932, imports into the port of New York were valued at $1,895,822,000, and the exports at $1,624,381,000.

In 1931 there were 8,226 miles of steam railroads and 936 miles of electric railroads in New York State. There are 525 miles of canal in the Empire State, 339 miles of which belong to the Erie Canal. The State has 14,000 miles of highways within its boundaries, 12,086 miles of which are improved and maintained by the State. The construction of the improved New York State Canal System was begun in 1905. The Champlain Canal was the first branch of the Barge Canal System to be completed. It was opened for traffic in 1916. The Oswego Canal was opened in 1917, and the complete route of the Erie Canal, from Troy to Buffalo, was opened in 1918. These waterways are managed, maintained, repaired and operated by the Superintendent of Public Works, acting through the Commissioner of Canals and Waterways.

Population. The State of New York is the most populous State in the Union. According to the census returns of 1930, the population of New York State was 12,588,066, an increase of 21.2 per cent over that of 1920. The urban population totalled 10,521,952. Native born whites in the State numbered 8,958,744. The foreign born white population, which in 1930 was 3,191,549, is comprised chiefly of Italians, 629,322; Russians, 481,306; Polish, 350,383; Germans, 349,196; British, 146,485, and Austrians, 142,298. The State has an Indian population of 6,973, of which number 4,666 dwell on seven reservations having an area of 137 square miles. The largest of these reservations is the Allegany in Cattaraugus County which extends over an area of fifty square miles.

The largest tribe is that of the Senecas, which has 2,485 members. Many of these Indians have adapted themselves remarkably well to the white man's civilization. Treaties and statutes regulate their tribal rights. Their Peacemakers' Courts have proved most efficient.

The principal cities of the State, with their populations in 1930, are New York City, 6,930,400; Buffalo, 573,076; Rochester, 328,132; Syracuse, 209,326; Yonkers, 134,646; Albany, the capital, 127,412, and Utica, 101,740.

Education. In 1930 the rate of illiteracy in the State had been reduced to 3.7 per cent, as compared with 5.1 per cent in 1920. In the interest of educational development, the State was organized in 1854 into 113 commissioners' districts under the Department of Education, the Board of Regents of the University of New York having supervision of the secondary and higher educational institutions since 1904. Education is compulsory in the State between the ages of seven and sixteen. During the school year 1930-31, there were 2,189,799 pupils enrolled in 11,791 public schools throughout the State. The faculty numbered 77,488. There are 1,248 public high schools and academies in New York State, with an enrollment in 1930 of 506,951 pupils; nine public normal schools with 9,524 students, and day vocational schools with a student body of 22,541 pupils. The State Education Department consists of the University of the State of New York.

There are 163 institutions of higher learning in the State including universities, colleges, professional and technical schools, which in 1930-31 had a total enrollment of 132,731 students and a faculty of 12,408. Among the leading colleges and universities in the State are New York University, which was founded in 1831, and in 1931-32 had a student body of 31,357; Columbia University at New York, which was founded in 1754 and in 1931-32 had an enrollment of 25,863; Fordham University at New York, which was founded in 1846; College of the City of New York, founded in 1854; Cornell University at Ithaca, organized in 1865; Hunter College, New York, founded in 1888, and Syracuse University, organized in 1870. The University of the State of New York has also chartered fourteen extra-territorial colleges which are situated in Brazil, Syria, Turkey, and China.

There were five charitable institutions under State supervision in 1931. The State Department of Social Welfare also exercises supervision over 1,078 charitable, eleemosynary, correctional and reformatory institutions.

Government. New York was admitted to statehood in the American Union in 1788, as one of the original thirteen states. The State Constitution was framed by a Convention which convened between July 9, 1776 and April 20, 1777. The present Constitution was adopted in the year 1894. The legislative department of State is comprised of a Senate of fifty-one members elected every two years, and an Assembly of 150 members who are elected annually. The legislature convenes annually. Since 1916 there has been proposed a convention to revise the existing constitution of the State. This question must be submitted to the people every twenty years or at such times as provided by law by the State Legislature.

New York State is represented in the National Congress by two Senators and forty-five Representatives.

The State is divided into sixty-two counties for purposes of local government. The government of New York City rests in a board of Aldermen elected for two-year terms, the members of which are the president, elected by the city; and the presidents of the five city boroughs. The board is comprised of sixty-seven aldermen, one elected in each of the sixty-seven districts. The board is constituted of seventy-three members, the chief executive officer of which is the Mayor who is elected for a four-year term.

History. The region and its chief waterways were at an early era visited by navigators and explorers, Portuguese, French and Spanish. Verrazano, it is recorded, discovered New York Bay and the mouth of the Hudson in 1524. It, however, was not until 1609 that the region came into historic note, for in that year Hudson ascended the river in the Dutch fur-trading interest; while almost simultaneously Lake Champlain was discovered by the founder of Quebec and father of New France. The Dutch astutely profited by the enmity of the Iroquois to the French, for they made friends of the Iroquois, who subserved their interests, or at least did not oppose their colonizing and trading in the New Netherlands. In 1623 settlements began to be formed, first by a number of Walloons on Manhattan and Long Island, while Fort Orange (Albany) was founded on the upper Hudson. The Indians, found at first to be tractable, were induced to part of their lands, and from them not only Manhattan and Staten Islands were acquired by Peter Minuit and Michael Pauw but Killian Van Rensselaer also secured holdings in the Albany region; while colonists, including French Huguenots and English Puritans, were encouraged to settle by the cancelling of the Dutch company's monopoly of trade. For a time, however, there was trouble with the Algonquins, and settlements in the neighborhood of New Amsterdam were destroyed and the colony threatened with extinction. Under Governor Stuyvesant (1647-64) the times were more or less stormy, but the colony grew apace. In the last year of Stuyvesant's rule New Amsterdam was confronted by the presence of an English fleet come to enforce the title of the region given by Charles II to the Duke of York, his brother. With the surrender of the garrison, Dutch rule, save in 1673-4, came to a close, and New Amsterdam gave place to its present title of New York. Under the English crown the colony remained until the Revolution, being under the control and sway of over thirty colonial Governors. During this period there at times were menacing movements on the border settlements; there also, were the harassing hostilities of the French and their dusky allies in 1757-63, the period of the French and Indian War; besides collisions during the era preceding the Revolution between the colonists who had grown restive under monarchical rule and the harsh sway of gubernatorial authority. The battle of Saratoga (1777) was the turning-point of the American Revolution, and it, with the battles of Oriskany and Walloomsac, two more of the most important battles of the Revolution, were fought in New York. New York also was the scene of considerable fighting in its northern area during the War of 1812-14, a conflict which bore heavily upon the border settlements from the Niagara district to the eastern end of Lake Ontario and on the St. Lawrence borders from Ogdensburg to the region round Lake Champlain. With peace came the era of canal construction, internal development, increasing colonization and, later, the beginnings of the railway system and improved highways. The State bore its share of the responsibilities and burdens entailed by the Civil War. Since then its progress has been continuously substantial and most gratifying.

New York City, the largest city in the Western Hemisphere, the second largest city of the world, and the chief city of the State of New York. The city is situated at the mouth of the Hudson River and extends thirty-six miles from the North River along 23rd Street, Manhattan, to the easterly border of Queens Borough. It is composed of five boroughs, Manhattan, Bronx, Brooklyn, Richmond, and Queens. The total area of these boroughs and of the incorporated city of New York is 308.86 square miles. Manhattan Island, heart of what is now the largest commercial and financial city of the United States, covers an area of forty-one and one-half square miles. It is situated between the Hudson, East, and Harlem rivers and is thirteen and one-half miles long. In the lower East Side, below 14th Street and east of Broadway, is to be found the most densely populated spot in the world.

New York City stretches before the eyes of a stranger like a mass of hopeless confusion. The mountain-like ridges of skyscrapers at the lower end of Manhattan dominate a scene that has not its equal for impressiveness of wealth, power and human achievement anywhere in the modern or the ancient world. Its tangle of waterways is arched high with bridges, tunnelled under with subways, swarming with shipping and woven by flying shuttles of ferryboats. Its islands and bordering mainlands bristle for miles with docks and slips. Farther than the eye can see, in every direction, stretch endless streets of tall, crowded buildings, filled with processions of millions of restless human beings. Undoubtedly the sight which first fascinates all strangers in this vast city, especially those from foreign shores, is the Statue of Liberty.

Statue of Liberty. The statue, which was created a National Monument by President Coolidge on October 15, 1924, is situated on Bedloe's Island in New York Harbor. It weighs 225 tons, the pedestal reaching a height of eighty-nine feet and the bronze alone weighs 200,000 pounds. The pedestal is sixty-two feet square at its base. In the left arm of Liberty rests a book which represents the law, bearing on it in block letters the date of July 4, 1776.

The statue was presented to the United States by the people of France who commissioned Frederic August Bartholdi, a distinguished sculptor, to do the work. A committee was organized in 1874 to raise funds for the monument. The sum of $300,000 was raised in the United States for the pedestal. Throughout France in the large cities, councils and societies, the French people contributed $700,000 to cover the cost of the statue. The work was finished in 1883. On August 5, 1884, the cornerstone of the pedestal was laid on Bedloe Island, where, in June, 1885, the statue landed from Rouen, France, aboard the vessel, *Isere*. In the latter part of the following year, on October 28, the statue was unveiled.

Up until 1931, the beauty of the statue has been somewhat marred at night by the shadows which formed about the monument. In October, 1931, a new floodlight system was put into operation by the hand of Mlle. Jose Laval, daughter of the French Premier at that time. The eleven-cornered star-shaped pedestal was equipped with ninety-six 1,000-watt lights, the glow of which flashes upward on the Statue. Eight similar lights were placed on the pedestal balcony, while the torch was fitted with fourteen 1,000-watt bulbs.

Ellis Island. The "Gateway of the New World" is situated in the Upper Bay and extends over an area of about twenty-one acres. In 1730 it became a part of the city of New York under the Montgomery Charter. In 1800 and 1880 the island was ceded to the Federal Government for specific use, although actual possession of the island was never relinquished by New York City. In 1892 the United States Government began to use the island as an immigrant station. The original wooden buildings, which the Government had erected in 1891, were destroyed by fire in 1897. Construction was immediately begun on new buildings and today Ellis Island has twenty-seven modern buildings, including an excellent hospital and well-equipped power houses. Aliens seeking entrance to the United States find comfortable lodging in the large, light, and airy buildings until they are granted permission to enter the country.

New York Harbor. The entrance to the city, New York Bay, is divided into two parts, the Lower Bay and the Upper Bay. The entrance to the Lower Bay is situated between Sandy Hook on the south and Rockaway

Point on the north. It is about six miles wide. The Upper Bay is situated by the Narrows and extends up to the Battery. New York Harbor has two major entrance channels, the Ambrose Channel and the Main Ship-Bayside-Gedney Channel.

The construction of the Ambrose Channel was completed on April 17, 1914. It is 38,000 feet long, 2,000 feet wide and forty feet deep at mean low water. Its course extends in a northwesterly and then in a northerly direction through the Lower Bay. The Main Ship-Bayside-Gedney Channel is 1,000 feet wide and thirty feet deep at mean low water. Its course extends in a westerly direction past Sandy Hook and northward through the Lower Bay. From Battery Park, where the Dutch built a warehouse fort in 1623, all the shores around the harbor may be seen. To the west, beyond the Hudson, lies the Jersey shore, covered by Jersey City and Hoboken. To the northeast, over the Harlem River, lies the mainland of New York state, and to the southeast is Long Island with Brooklyn. East River, which separates Manhattan from Long Island, is not a river but a strait connecting upper New York Bay with Long Island Sound. It is long and winding, a mile wide at its narrowest point, and contains three large islands—Ward's, Randall's, and Blackwell's—that are occupied chiefly by the city's institutions and prisons. Since 1876, when the rocks in Hell Gate Pass were blown up, ocean-going steamers are able to enter the Upper Bay from the Sound. The harbor is closed on the south by the beautiful wooded slopes of Staten Island. It is these natural boundaries of water which separate Greater New York into five boroughs.

Thoroughfares. The principal street, the longest continuous street in the world, and one which is always associated with New York City's "Great White Way," is Broadway, which extends the full length of the city. Just four blocks from the Battery, at Broadway, is situated the extreme western end of Wall Street, the financial heart of the metropolis. Two miles north, at Union Square and Broadway, is the center of the publishing business. In the business section of New York City Broadway is but eighty feet wide. As the street wends its way farther north, however, it becomes wider until it attains a width of about 160 feet. At Forty-second Street and Broadway is situated Times Square. This also marks the beginning of the "Great White Way," which stretches out in majestic brilliance to Fifty-ninth Street. At that point Broadway unites with Eighth Avenue and forms Columbus Circle which extends to Seventy-eighth Street, Broadway pursuing a diagonal course. This main thoroughfare of New York City continues its course into Yonkers at 262nd Street.

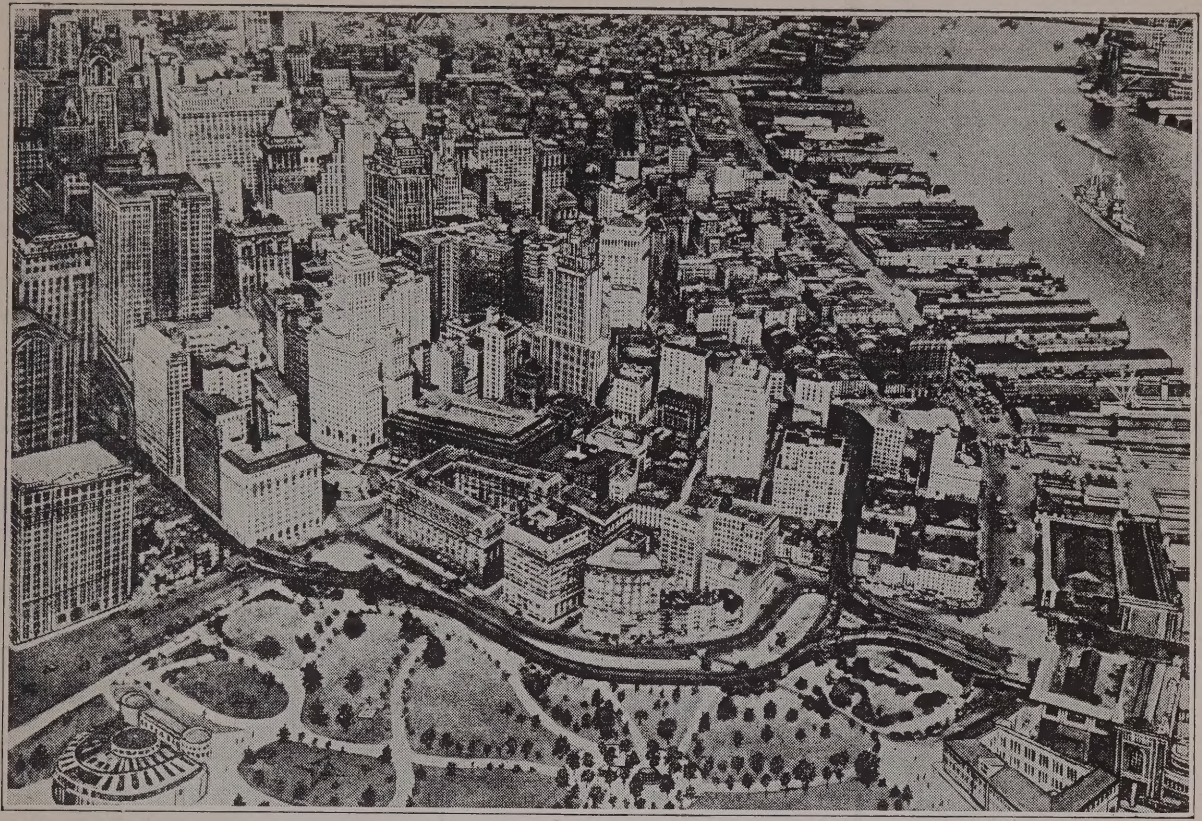
Other important thoroughfares include Riverside Drive, which, above West 157th Street, was formerly known as Boulevard LaFayette; Ft. Washington Avenue; Chatham Square, named after William Pitt, the Earl of Chatham; Cherry Street, which at one time was a cherry orchard; and Montgomery Street, named after General Montgomery who fell at Quebec in 1775. These thoroughfares are all situated in Manhattan. In the Bronx one of the chief thoroughfares is Sound View Avenue, which used to be called Clason's Point Road. In Queens, Astoria Avenue; Queens Boulevard and Jamaica Avenue are among the important thoroughfares. Richmond Avenue, in the borough of Richmond, was formerly the Old Stone Road. Hylan Boulevard is also an important thoroughfare of Richmond.

On January 1, 1933, New York City had 3,284.4 miles of paved streets. Among the leading thoroughfares of New York City perhaps the most outstanding are Amsterdam Avenue, Central Park West, Columbus Avenue, Fifth Avenue, Lenox Avenue, Lexington Avenue, Madison Avenue, Riverside Drive, and Third Avenue.

Transportation. A visitor to New York City in 1832 rode a horse car, the mode of transportation in those early days. It was more than fifty years later that cable cars made an appearance on 125th Street. In 1893 electric trolley cars, with wires in the underground cable slots, were put into operation on 116th Street. The first subway trains were run in New York City on Broadway in 1904, operating from 145th Street and Broadway to West Farms. In 1905 the service was extended through the Harlem River tunnel to 180th Street. Since that date the subway system has been vastly improved and extended. In 1924 the Board of Transportation was created by the Legislature. Under the auspices of this board an independent subway system now operates in Manhattan, Brooklyn and Queens boroughs.

Two of the major subway systems now operating in New York City are controlled by the Interborough Rapid Transit Company and the Brooklyn-Manhattan Transit Corporation. Other subway systems include the Queensboro subway which operates between Times Square, Manhattan, and Flushing, Long Island; the Cranberry-Culver line which gives service between Church Street, Manhattan, to Cortelyou Road, Brooklyn; and the Houston-Jay Street subway from Sixth Avenue, Manhattan, to High Street, Brooklyn.

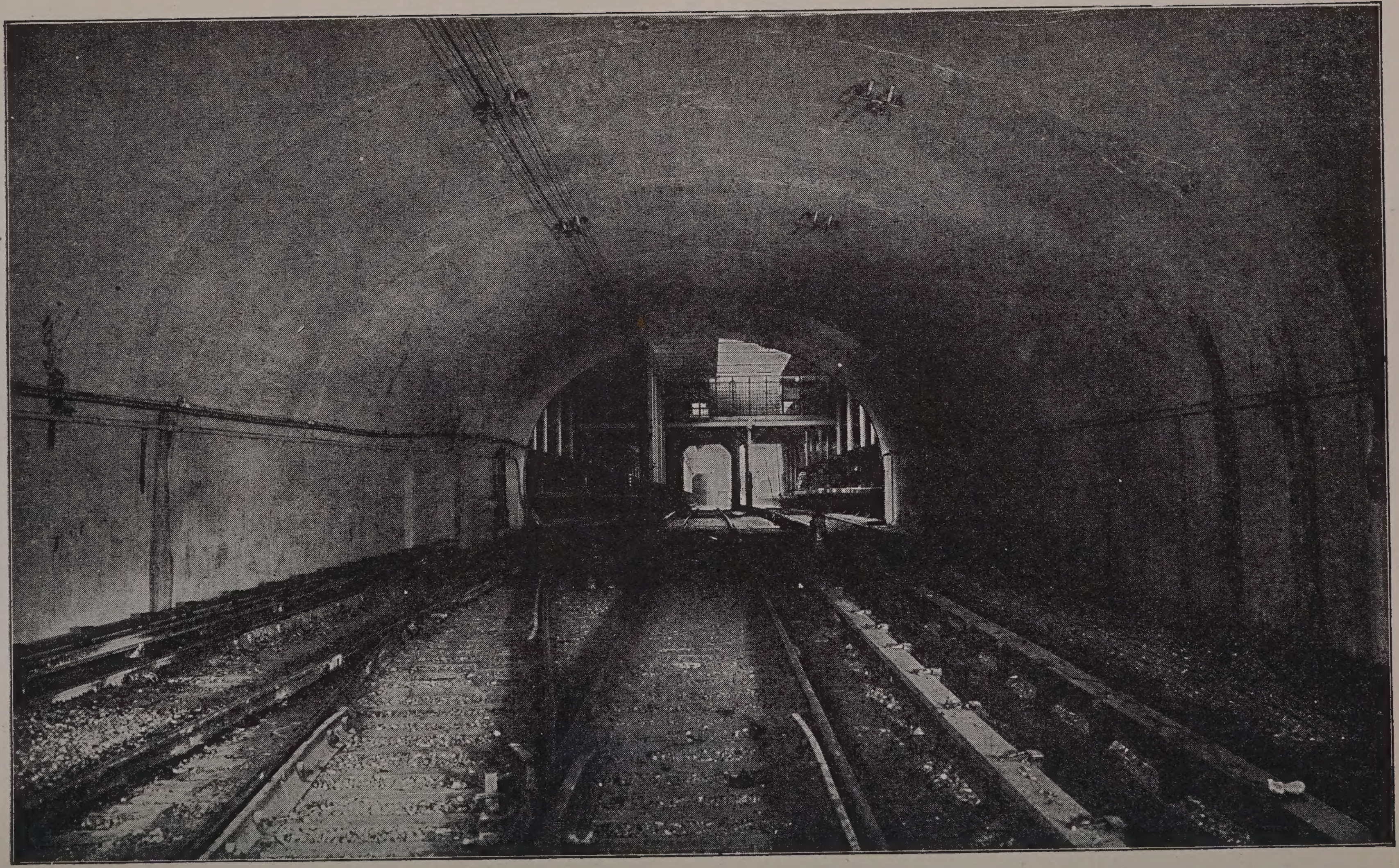
One of New York City's greatest problems has been the establishing of transportation facilities, and the greater part of its colossal engineering works have aimed at the solution of this problem. Transportation between Brooklyn and Queens, and between Manhattan and the Bronx, has been facilitated by the construction of four bridges across the East River. The first of these bridges to be completed was the Brooklyn Bridge with a span of 1,595.5 feet, which was opened in 1883. The Williamsburg Bridge, length of span 1,600 feet was opened in 1909, as was the Manhattan Bridge, length of span, 1,470 feet These are suspension bridges connecting Manhattan and Brook-



An Airview of Lower Manhattan
On the right of the picture may be seen the East River piers at which are loaded and unloaded the cargoes of ships that visit the ports of all the world.

Budweiser
King of
BOTTLED
BEER
DANCE
DANCING
AUTOMAT
CAPITOL
Coca-Cola

The Great White Way
A night view of Broadway, the most famous thoroughfare in the world.



IN THE NEW YORK SUBWAY

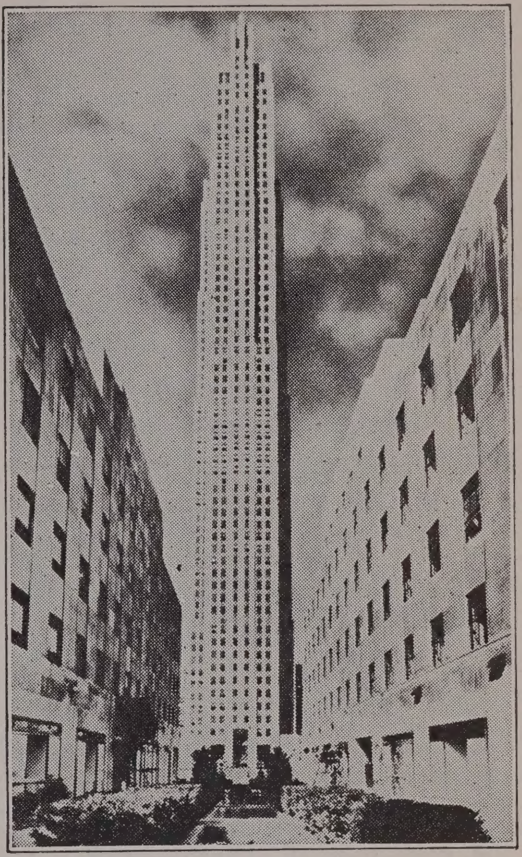
lyn. The Queensboro Bridge, a cantilever bridge with a span of 1,182 feet, was opened in this same year.

New York City boasts of several other important bridges. The George Washington Bridge extends from Broadway and 178th Street and 179th Street, Manhattan, to Fort Lee, New Jersey. It is a suspension bridge equipped with four wire cables which are thirty-six inches in diameter. The towers of the bridge rise 635 feet above the water. It was completed in 1931. The Bayonne Bridge, which was opened in 1931, extends from Port Richmond, Staten Island, to Bayonne, New Jersey. This is the longest arch span in the world. All of the bridges, with the exception of the Hell Gate arch bridge, are owned by the City of New York.

There are many tunnels in operation in and about New York City. Vehicular traffic is excellently handled by the Holland Tunnel, twin tubes which stretch across under the Hudson (North) River. The tunnel is 9,250 feet long and extends from Canal Street, Manhattan to Twelfth Street, Jersey City. Tunnels of the Hudson and Manhattan Railroad System and several ferries also serve as means of communication with New Jersey.

In addition to the subways and tunnels New York City has an extensive system of street, elevated and bus lines in operation. The city is connected by railway with all parts of the nation. The Grand Central Station, which is situated at Forty-second Street between Madison and Lexington avenues, and the terminal of the Pennsylvania Railroad situated at Thirty-second Street, between Seventh and Eighth avenues, are the largest and most beautiful edifices of their kind in the world. The New York Central; the New York, Hartford and New Haven Railroad; the Pennsylvania Railroad; the Baltimore and Ohio; the Erie; the Lackawanna; the Reading and Lehigh Valley lines enter the city. New York City also has well-developed air lines. Among the outstanding flying fields are the Curtiss Field, situated at Garden City, Long Island; Roosevelt Field at Mineola, Long Island; Newark Airport at Newark, New Jersey; and the Floyd Bennett Airport, situated on Barren Island in Jamaica Bay. The latter airport consists of 387 acres. It was opened in 1931.

Buildings. "The City" where money is made could expand only in two directions—northward or skyward. The invention of the steel-cage or Chicago-construction building and of the passenger elevator made it possible to grow skyward. New York City's superstructure is the Empire State Building which is situated at 34th Street and Fifth Avenue. It is 102 stories high, rising 1,248 feet in the air. It was constructed at a cost of $32,500,000. The Chrysler Building, located at Lexington Avenue and 42nd Street, towers 1,046 feet above the street, and consists of 77 stories. Rockefeller Center extends three large city blocks from 48th Street to 51st Street, between Fifth and Sixth Avenues. It covers about twelve acres of ground, approximately 513,575 square feet. It is on this ground, in the center block between 49th and 50th Streets, that the RCA Building was erected. It is a seventy-story structure, 850 feet high and occupies an area of 99,770 square feet. This skyscraper is the world's largest office building in floor space, the floor area being more than 2,000,000 square feet. The RCA Building contains the offices of the Radio Corporation of America. There are twenty-eight studios and five audition rooms of the National Broadcasting Company located in the building. Among the many other skyscrapers is the famous Woolworth Building. It is situated at 233 Broadway between Barclay Street and Park Place. It rises 790 feet in the air and is a fifty-five story structure. The Singer Building is as noteworthy for its beauty as for its height. Viewed from the Brooklyn Bridge, its proportions, grace and detail remind one of the beautiful Shepherd's Tower of Giotto in Florence. It is forty-one stories high.



NEW RCA BUILDING © *Acme*

This structure rises in classic simplicity seventy stories. It is the largest office building in the world in point of gross floor area.

Quite apart from the skyscraper group New York City has many buildings which are world-famous for their architecture and beauty. The Metropolitan Museum of Art, situated in Central Park facing Fifth Avenue at 82nd Street, contains one of the most excellent displays of objects and collections of note to be found in the wide world. The New York Public Library is especially noted for its extreme beauty of design. It is located at Fifth Avenue and 42nd Street, and was constructed at a cost of $9,000,000 in 1911. The library contains three exhibition rooms and two galleries devoted to the Lenox and Stuart art collections.

Churches. New York City has more than 2,500 churches, a total which includes three cathedrals. St. Patrick's, a Roman Catholic cathedral, is situated at Fifth Avenue and 50th Street. The Cathedral of St. John the Divine, a Protestant Episcopal church, is located on West 111th Street between Amsterdam and Morningside Avenues. New York City's other cathedral is that of St. Nicholas, a Greek Orthodox church, situated at 15 East 97th Street, near Fifth Avenue. The church which is especially regarded with reverence by New York's theatrical group is the Church of the Transfiguration which is known as "The Little Church Around the Corner." It is situated on Twenty-ninth Street near Madison Avenue.

Parks. There are 117 parks in the City of New York. More than 9,312 acres are devoted to these parks. Central Park, which extends from 59th Street to 110th Street, Manhattan, and covers an area of 840 acres, is undoubtedly the most famous of New York City's public parks. Larger in area, however, is Pelham Bay Park, situated in the Bronx. It covers an area of 1,797 acres and offers bathing, golf, baseball, and tennis facilities to many New Yorkers. The Van Cortlandt Park, the Bronx, is situated at Broadway and 242nd Street at Yonkers line and has an area of 1,132 acres. Those seeking recreation are attracted by the golf, baseball, tennis, football, polo, boating, and cross-country running events which are featured here. In Brooklyn, Marine Park extends over an area of 1,234 acres. The New York Zoölogical Park was founded by the New York Zoölogical Society in 1895 and was opened to the public in 1899. The park extends over an area of 264 acres, thirty-five of which are water. Here the visitor will find unusual collections of wild game housed in the Elephant, Lion, Primate, Zebra, Large Bird, Reptile, Antelope, Ostrich, Small Mammal Houses, and the Aquatic Bird Buildings. The park is free to the public except on Mondays and Thursdays. It is popularly known as the Bronx Zoo.

Education. New York City in 1933 had 702 day schools with an average attendance of 1,022,894 pupils. There are in addition to these day schools fifteen *compulsory continuation* schools with a faculty of 344 teachers and an average attendance of 7,580 pupils. In the field of higher education New York City is the home of Columbia University, situated on Morningside Heights, and New York University in the Bronx, two of the largest universities in the country. Barnard College for Women is affiliated with Columbia University. New York, Fordham, and Long Island Universities are also situated here. There are many technical institutions in the city, the most important being the General Society of Mechanics and Tradesmen, established in 1785, the Mechanics Institute School, Cooper Union, and the Pratt and Polytechnic Institutes at Brooklyn.

Commerce and Industry. New York's financial and commercial interests are on so enormous a scale that they overshadow its great manufacturing industries. It produces vast quantities of clothing, boots, shoes, cigars, furniture, foundry and plumbers' castings, jewelry, machinery and musical instruments. It has sugar refineries, packing-houses, flour, coffee and spice mills, marble and stonecutting yards. Because of its advantageous geographical position, New York City's commercial importance was only natural during the course of its development. It is the most important seaport of the United States. In 1933, 3,273 vessels entered the port of New York with a total tonnage of 19,810,796.

Government. The government of the city is vested in a board of aldermen of sixty-seven members, one from each of the sixty-seven districts. These aldermen are elected for two-year terms. Members of the board include a president, who is elected by the city, and the presidents of the five boroughs of Bronx, Manhattan, Brooklyn, Queens, and Richmond. The chief executive officer of the city is the Mayor who is elected for four years. The Comptroller is elected by the city and directs the Board of Finance. These eight officers comprise the Board of Estimate and Apportionment. All other heads of departments are appointed by the Mayor. This form of city government was provided for in the Greater New York Charter of 1897.

For more than twenty years Tammany Hall controlled New York City politically. In 1932 as a result of the Seabury investigation of the municipal government, Tammany was placed in a defensive position. The mayoralty election of November 7, 1933, then, was carefully watched as an event of peculiar interest and extreme importance not only to New Yorkers but to all Americans. Represented in the three-cornered-election contest were the Fusion group, composed of Republicans and Independent Democrats; the Democrats grouped in opposition to the Tammany Hall group, and Tammany Hall. The candidate of the Fusion group was Fiorello H. La Guardia, former Republican Congressman for the 14th District. The Democratic candidate was Joseph V. McKee, former Acting Mayor upon the resignation of James J. Walker in 1932. Mayor John P. O'Brien represented the interests of Tammany Hall. Fiorello H. La Guardia emerged from the contest the victor, and the power of Tammany Hall was broken in New York City. La Guardia won the election by a large plurality. A total of 2,112,146 votes were cast during the election. Of this total La

Guardia received 858,551; McKee, 604,045, and O'Brien, 586,100. La Guardia assumed the duties of his office on January 1, 1934, determined to destroy the graft and corruption which have dominated the politics of New York City for more than twenty years.

Population. United under one municipal government in 1898 with an aggregate of 3,437,200 people, in 1930 the number had increased to 6,930,446. Of this total 4,293,825 were native whites. Foreign born whites numbered 2,293,400. Negroes comprise 327,706 of the population. 172,025 of the foreign born white population are unable to speak English and 101,291 are illiterate. More than half of the illiterate group are from Italy, the remainder of the group being composed of Russians, Poles, Austrians, Germans, Rumanians, Greeks, Hungarians, and Czechoslovakians. The population of New York City, according to the latest Federal census, was Manhattan, 1,867,312; Bronx, 1,265,258; Brooklyn, 2,560,401; Queens, 1,079,129; Richmond, 158,346, making New York with its population of 6,930,400 the second largest city in the world. It is surpassed only by London (Greater) with its population of 8,202,818.

History. In 1609, the year that Henry Hudson sailed through the Narrows, the site now occupied by New York City was a wild and beautiful spot, the lower end covered with forests and sloping pasture. Although Manhattan Island was settled by white men—bought for trumpery beads, brass ornaments and bright cloth—nearly 300 years ago, and although Brooklyn, New Jersey and Staten Island were occupied before 1640, the importance of New York City dates back little more than a century. Until after the Revolutionary War it was outranked by Boston and Philadelphia. Before 1825 and the opening of the Erie Canal to Buffalo, its inland trade extended beyond Albany only by wagon road. As the Dutch colony of New Amsterdam it existed only forty years. In 1664 it was captured by the Duke of York, afterwards James II of England.

At that time it had 1,500 people, and the Dutch had so stamped their character, architecture, customs and language on the colony, that it remained Dutch for a hundred years, although an English colony. Descendants of wealthy Dutchmen who took up manories along the Hudson form the oldest aristocracy of New York today. The Bowery, Broadway, Bowling Green, Wall Street, Pearl Street, De Lancey Slip, recall old Dutch days, as do Harlem and Spuyten, Duyvil, Hoboken, Yonkers and points far up the Hudson. The first city charter was obtained in 1686. The foundation of the city's wealth, in Dutch colonial days, in furs, then in its windmills which gave it the monopoly in the bolting of flour for export, are set forth on New York's city seal. It displays the four wooden sails of a mill, flanked by two beaver and by two flour barrels.

The close of the Revolutionary War left New York City in a deplorable condition—half of it destroyed by fire—business dead. New York City was the nation's capital from 1785-1790. The first sidewalks were not laid, nor the houses numbered, until 1790. In 1800 the city had 60,000 inhabitants and extended to 14th Street. The invention of the steamboat in 1807 gave the city its first real start. The opening of the Erie Canal in 1825 extended its trade to Chicago, then a military post. New York linked the Old World with the new West. By 1830 it had 200,000 people. Before the first railroads were built to the West it had established its supremacy as the center of trade, finance, art, literature and fashion.

At the beginning of the Civil War, New York had 800,000 inhabitants. Railroads had extended trade to the Mississippi. In 1878 the first elevated road was opened in the city, and 1883 the construction of the Brooklyn Bridge was completed. Harlem River had already been bridged, and railroads from the Hudson Valley and New England entered Manhattan from the north. West and south traffic terminated at Jersey City, and transfer was made by ferry.

By 1899, to use a chemical expression, New York was populated to the point of saturation. More and more people had to get away from Manhattan Island at night, and no more streets were available for cars. The subway was built by the city at a cost of $35,000,000 and leased to the constructing company for seventy-five years for a percentage of the receipts, an experiment in municipal ownership. Tunnels were constructed under the Hudson and East Rivers connecting Jersey City and Brooklyn. Wall Street, that financial center of New York City which has become famed throughout the world, expanded skyward. Thus has New York City grown from the little Dutch settlement of 1624 to the second largest city in the world in 1934. New York is the oldest and newest and greatest thing in America; an epitome of our history and the essence of our achievement.

New York Public Library was established in 1895 by the consolidation of Astor Library, Lenox Library and the Tilden Trust, with which were later included New York Library and its forty-two city libraries, endowed by the munificence of Andrew Carnegie. The new home of the consolidated institutions is the palatial building in Bryant Park, facing Fifth Avenue on the west and close to Forty-Second Street. The library, besides its other equipments, has shelf-room for not far from two million volumes. This monumental institution, provided by the city and in part to be maintained by it, consists of a union, by agreement, with the several trustees of the specific libraries named, with their corporate endowments, together with other free libraries which have elected to be consolidated with it. The chief associated and affiliated institutions, in addition to Astor Library, embrace Lenox Library, founded in 1870 as a gift to the city by the late James Lenox, with many valuable paintings and objects of art which he had collected and inherited, and the Tilden Trust, comprising 20,000 volumes and two million dollars, deeded by will in 1884 by Samuel Jones Tilden for the establishment and endowment of a public library in New York City. With these institutions have been incorporated the city's Free Circulating Library and other similar free libraries, in addition to the scheme of branch libraries which the city obtained through the liberality of Mr. Carnegie by his gift of $5,200,000. To the Lenox bequest have been added several other substantial collections and property gifts, contributed by relatives of the original donor.

New York [City] University, an institution of higher learning in New York City. It had its inception at a meeting of citizens of high standing on Jan. 4, 1830. A committee appointed at this meeting received a large number of subscribers to the establishment of a new university on a "liberal and comprehensive foundation." The first university council was elected by these subscribers on April 18, 1831. University College opened in the following year. The first building was erected on Washington Square in 1835. The law-school was opened the same year, the medical school in 1841, the school of applied science in 1862, the graduate school in 1886, the school of pedagogy in 1890, the veterinary college in 1898, and the school of commerce in 1900. The university comprises eight distinct faculties and schools of matriculants under its council and, in addition, the summer-school and the woman's law-class, both made up of nonmatriculants who are enrolled without examination. The era of greatest development was from 1890 to 1900. In 1891 22 acres of land, now known as University Heights, overlooking Harlem River, were acquired. Several buildings have been erected, in which some of the schools are now accommodated. The library, completed in 1900, is the chief architectural feature with its open colonnade, the Hall of Fame, extending halfway around and overlooking the Harlem. The Hall of Fame (*q. v.*), although not a place of burial, is intended, from a memorial standpoint, to perform a function for distinguished Americans similar to that of Westminster Abbey, whose statues, tablets and tombs commemorate the long line of England's distinguished dead. The names of five Americans, including women, considered worthy of the honor and who have been dead ten or more years are chosen every five years by a committee and these names are inscribed on memorial tablets in the walls of the Colonnade. The Hall of Fame was the gift of Helen Gould (later Mrs. Shepard.)

New York, University of the State of, is a department of state and also is a federation of nearly 2,000 institutions of higher and secondary education. Its object is to promote such education. Its organization includes educational agencies as diverse as academies and extension-courses, colleges and libraries, high schools and museums, and professional or technical schools, study-classes and universities. It is governed by the governor, lieutenant-governor, secretary of state and superintendent of instruction, whose public office makes them regents, and by 19 regents elected as such by popular vote. They control the charters of educational institutions; confer honorary degrees; appoint boards to examine candidates for the professions; and distribute funds. They also supervise secondary institutions and professional education. The university consists of the administrative, collegiate, high-school and home-education departments, the state library and the state museum. It originated in 1784, Alexander Hamilton, James Duane, Ezra L'Hommedieu and other men of mark being its authors. The idea of an educational government, distinct from every teaching institution but bringing all into vital relations with the state, was reached later. New York's whole system of higher professional and technical education rests on the supervision of education in high schools and academies by the university. It has stimulated the improvement of commercial education and of business schools. The state library has over 1,064,865 manuscripts, pamphlets and volumes. The museum includes seven departments; engages in practical scientific experiment and pure research; and possesses extensive and valuable collections. Albany is the headquarters of the university.

New Zea'land lies in the Pacific about 1,200 miles southeast of Australia and is the largest island in that ocean. It was discovered by Tasman in 1642. Captain Cook took possession for England in 1769. Settlement began about 1820. It is a British colony, with a local government extending to 1852. There are two principal islands, known as North Island and Middle Island, beside South or Stewart Island and some small outlying islets. The total area is estimated at 104,751 square miles, with a total population of 1,300,000, exclusive of aborigines who chiefly are Maoris (62,184 in number). There were 2,570 Chinese. The chief town is Auckland, with a population, including suburbs, of 102,676. Wellington (70,729) is the seat of government. The other towns of note are Christchurch (80,193) and Dunedin (64,237). Of volcanic origin, New Zealand has chains of high mountains, hot geyser springs and other natural features of bold and varied character, incident to its eruptive origin. It has a temperate climate favorable to the growth of rich, succulent grasses and the rearing of sheep and cattle. Its area under crop at present exceeds 16,000,000 acres, while 17,000,000 remain under forest, and

9,000,000 are barren mountain tops, lakes and worthless country. Large amounts of capital are invested not only in agriculture and mining, but in meat-freezing and preserving, in tanning, wool scouring and factories for butter and cheese. Besides the wool crop and the farm and dairy products, there is a large annual export of tallow, hides, skins and leather, together with gold, valued at $10,000,000 for the yearly output. Progress was long retarded by wars with the Maoris, a magnificent race of barbarians. There are two houses of parliament, the members of both of which are paid. In the popular chamber sit four Maori members, representing native districts under the Maori representative act. There is no state church, nor is any state aid given to any religion. The school system is administered by an educational department under a minister, assisted by education boards and school committees. The University of New Zealand is solely an examining body, awarding scholarships to be held by students at affiliated colleges. These are Otago University at Dunedin, with 35 professors; Canterbury College at Christchurch, with 18 professors; Auckland University College, with 14 professors; and Victoria College, Wellington, with nine professors, including lectures at each. All are endowed with land, and have over 1,500 students in attendance. Public schools number 2,096, teachers 4,408 and pupils 156,324. There are 318 private schools with 18,981 pupils; three schools of mines; four normal schools; five central schools of art; 11 industrial schools; and 100 Maori schools. Most of the railways belong to the state and yield a good annual revenue; the gross mileage in both islands is 2,604 miles. In the chief towns there are tramways worked by cables, steam motors or electricity. The troops from New Zealand and Australia rendered splendid service to the mother country during the European War. New Zealand is famous for its experiments in the nationalization of industry.

New'ark, N. J., county-seat of Essex County, on Passaic River, nine miles south of New York. During the World War the U. S. Shipping Board spent $12,000,000 for the improvement of its heretofore neglected harbor, which immediately became a chief Atlantic port; 35 vessels leave each week for all parts of the world. The city was settled by a Connecticut colony in 1666, obtained a city charter in 1836, and manufactures much jewelry, brass, ironware, hardware, machinery, leather goods, head wear. Population, 1925, about 450,000.

Newark, O., county-seat of Licking County, lies on Licking River, 31 miles northeast of Columbus. It is a manufacturing city, turning out machinery, furnaces, safes, rope goods, steel rails, boilers, flour and glassware. This city has one of the largest bottle-factories in the world and the largest stove-works. Population 30,000.

Newbern (*nū'bĕrn*), **N. C.,** city, county-seat of Craven County, about 100 miles southeast of Raleigh. It is the port of entry of the Pamlico district; is at the junction of Neuse and Trent Rivers; and is served by three railroads, besides having steamers to New York and other Atlantic ports. The important industrial establishments are a turpentine-distillery, carriage and canning factories, fertilizing works, gristmills, planing mills, shingle-factories, a shipyard and the Atlantic and North Carolina Railroad shops. A noteworthy building is the government building, which contains a custom house, a postoffice and a court-house. Separate schools are maintained for white and colored, and the city has several churches. The electric-light plant and waterworks are owned by the city. The place was settled in 1710 by Swiss and Germans, and named New Berne after Berne, Switzerland. It was incorporated as a city in 1723. Population 16,000.

New'berry, John Strong, an American scientist, was born at Windsor, Conn., Dec. 22, 1822, educated at Western Reserve College and Cleveland Medical College, graduating from the latter in 1848. He accepted an appointment in 1855 as surgeon and geologist to accompany the United States exploring expedition to the country between San Francisco and Columbia River. In 1857 he explored the cañon of the Colorado, devoting nearly a year to the task. In 1859 he made scientific trips through southern Colorado, Utah, northern Arizona and New Mexico. During the Civil War he was in charge of all the operations of the United States Sanitary Commission throughout the Mississippi valley. At the close of the war he was appointed professor of geology in the School of Mines, Columbia College, New York. In 1869 he superintended the geological survey of Ohio. He was elected a member of nearly all the scientific associations of his own country and of Europe, and received the Murchison medal from the Geological Society of London in 1888. Perhaps his first publication was his report upon *The Geology, Botany and Zoology of Northern California and Oregon;* and his latest was *The Paleozoic Fishes of North America.* He died at New Haven, Conn., Dec. 7, 1892.

Newberry, Walter Loomis, American merchant and philanthropist, was born at East Windsor, Conn., Sept. 18, 1804. He removed to Chicago in 1833, where he amassed a fortune in trade and banking. He left over $2,000,000 with which to erect and maintain a library. The building which was a result of this bequest fronts upon Walton Place, Chicago, and is one of the architectural ornaments of the city. The library it contains is one of the finest reference libraries in America. Mr. Newberry died at sea, Nov. 6, 1868.

New'burgh, N. Y., capital of Orange County, lies on the right bank of the Hudson, in the beautiful Highlands. It has foundries, boiler works and shipyards; manufactures woolen and cotton goods, leather, soap, brushes and paints; and ships large quantities of butter, grain, flour and coal. In the Revolutionary War the American army disbanded here on June 23, 1783. Population 33,000.

New'buryport', Mass., a city and port of entry, is on the south bank of the Merrimac, three miles from its mouth and 37 miles by rail northeast of Boston. At Newburyport the river is spanned by a chain bridge, America's first suspension bridge, built in 1792. A long, shady, high street, with a pond of six acres, is the city's chief ornament. Shipbuilding is carried on, and there are a number of large cotton and shoe factories and a silver factory, besides manufactories of combs, hats and pumps. Here George Whitefield, who died in 1770, is buried, and here Wm. Lloyd Garrison was born.

New'castle-upon-Tyne, a city and county by itself, lies upon Tyne River ,in Northumberland, 117 miles south of Edinburgh. During the Roman occupation of Britain it was a military station, and afterward became a monastic settlement and was known as Monkchester. In 1080 Robert of Normandy, son of William the Conqueror, constructed a fort which he called Newcastle. The city is built mostly on slopes and rising ground, and shows the combined effects of ancient and modern architecture. Among interesting buildings are the Norman Keep, the Black Gate, the St. Nicholas cathedral and the churches of St. John and St. Andrew. Newcastle has a large public library, two colleges, the Royal Infirmary, Jesus' Hospital and the Keelmen's Hospital. Its principal manufactures are marine and locomotive engines, machinery, heavy ordnance, carriages, harness, lead, glass, earthenware, cement, brick, tile. It has since the 13th century been the most important coal-shipping center in Europe. Population 215,328. See histories of the town by J. R. Boyle and others.

New'comb, Simon, a distinguished mathematical astronomer, born at Wallace, Nova Scotia, March 12, 1835. Coming to the United States in 1853, he secured, through the influence of Joseph Henry, an appointment as computer on the *Nautical Almanac* in 1857. He graduated from Lawrence Scientific School at Cambridge in 1858, and spent three years there as a graduate student, at the end of which time he went to the Naval Observatory in Washington as professor of mathematics in the United States navy. His work here in connection with the establishment of the 26-inch equatorial, the various expeditions to observe transits of Venus and solar eclipses, his superintendence of the *Nautical Almanac* and his important memoirs on celestial dynamics placed him in the front rank of astronomers. In 1884 he accepted the chair of mathematics at Johns Hopkins University, while retaining his work in Washington. Professor Newcomb is a man of extraordinarily wide interests, and has thought and written much on subjects outside of his own specialty, particularly on political economy. He has been the recipient of many honorary degrees and of medals and honorary memberships from learned societies. His publications embrace *Popular Astronomy*, *Elements of Astronomy*, *The Stars*, *Astronomy for Everybody*, *Political Economy* and *Reminiscences of an Astronomer.*

New'foundland is the most ancient of the British colonies. For over a century it was the only colony owned and governed by England in the new world. In 1497 John Cabot made the voyage from Bristol to Newfoundland, which lies north of the Gulf of St. Lawrence and Cape Breton, and is separated from Labrador by the Straits of Belle Isle, only 10 miles wide in places. Cape Breton is 50 miles distant to the south.

History. It is alleged that the West-of-England fishermen kept their profitable voyages to Newfoundland concealed from the Crown for 50 years and that they were able to do this by bribing the officials. One writer says that it was the great trade and fishery of Newfoundland that first drew Englishmen from the narrow seas and made them a nation of sailors. In the reign of Elizabeth 10,000 men were employed in the Newfoundland business, which amounted to more than £500,000 a year. The English Newfoundland fishermen played a gallant part in the defeat of the Spanish Armada in 1588. Newfoundland was colonized by hard-working, humble settlers from Devonshire. Charles II sold Placentia and the western part of the island to Louis XIV, and this was the commencement of the vexed French-Shore question. The end of the seven years' conflict between England and France (1757–63) was signalized in Newfoundland by one of the most brilliant actions of the whole war, the defeat of the French and the recapture of St. Johns in 1762. The policy of England towards Newfoundland for a long time was anything but generous. A witness before a committee of the House of Commons in 1793 said: ' The island of Newfoundland has been considered in all former times as a great ship moored near the Banks during the fishing-season for the convenience of English fishermen only.'' The first civil governor was appointed in 1825, and the first general election for a local House of Assembly was in 1832. Responsible government came in 1855. Not until 1881 was the railway, which has been built across the island, commenced. From that time the progress of the colony began. It gave life to lumbering and mining.

Physical Features. For a fast cruiser Newfoundland is only four days from Ireland (1,640 miles). This fact makes plain its importance to Great Britain and Canada as a base for guarding the Atlantic route. It is larger than Ireland, being the tenth largest island in the world. It contains 42,000 square miles. It is the key of the St. Lawrence and, as a naval base, commands the whole trade of the northern Atlantic. Its population is 237,531, all living on the coast. There is twice as much sunshine in Newfoundland as in Great Britain. From June to October the climate is delightful. Its interior is an immense game preserve. For its size it contains more caribou (a subspecies of the European reindeer) than any other part of the world. The forests of the center and north are almost impenetrable, and furnish safe quarters for the deer. Beaver, otter and foxes are found all over the island. The Atlantic salmon is found in hundreds of streams, and the numerous lakes abound with trout. The resemblance between Newfoundland and the British Isles is remarkable. Both occupy the same relative position, the one on the northwest of Europe, the other on the northeast of America. Both the British Isles and Newfoundland were broken off from the mainland.

Resources. The ice-burdened, northern current, laden with fish, furnishes food for the cod, herring and seals, which are the mainstay of the chief industry. Newfoundland has the largest catch of cod in the world. Almost every known metallic substance of value is found. There is an abundance of iron and copper. Its coal deposits are being developed. Copper ore to the value of $17,000,000 has been exported. At Bell Island, Conception Bay, one of the most valuable iron-mines in the world is now being developed. It is owned by the Nova Scotia Steel Company and the Dominion Iron and Steel Company. There is an immense quantity of gypsum. Only one sixth of Newfoundland is fit for agriculture. One half of it is rough and broken. One third is covered with lakes. The value of the fisheries each year is over $9,000,000. About $300,000 worth of lumber is exported yearly. There is an enormous quantity of small spruce and fir near the lakes and rivers. Its total exports exceed its imports in value. A large part of its food and manufactured goods it uses are bought abroad. Its export of copper and iron ore each year amounts to $1,500,000. Exploits River (the chief center of the salmon-fishing) is the largest in Newfoundland. It runs in a northeasterly direction and is 200 miles long. Placentia Bay on the south is noted for its valuable fisheries of cod, salmon and herring. St. Pierre and Miquelon Islands on the south belong to France, and trade heavily with Newfoundland and Canada. They are valuable as fishing-stations for French fishermen on the Banks. The fogs on the eastern coast are caused by the cold waters of the Arctic current meeting the warm waters of the Gulf Stream. The Banks of Newfoundland (elevations of the ocean-bed, 600 miles long and 200 broad) are about 100 miles from the shore.

The French, by treaty, acquired rights of fishing on part of the shore. This is called The French Shore. These rights have proved injurious to Newfoundland, causing friction in various ways. There are 500 miles of railway. The governor is appointed by the king of England. Its legislature is elected. Its capital is St. Johns, located on St. Johns Harbor, which is said to be one of the finest in the world. Its chief industry is exporting fish. It has a good graving-dock accommodating the largest vessels. It is the nearest port in America to Europe. Its population is 31,501.

Education. The public-school system is denominational. In the old days the only schools were those supported by the various religious denominations. The schools and colleges annually prepare their pupils for written examinations, the papers being prepared in England and the answers sent to England for marking. This is done to avoid any suspicion of denominational partiality or control.

New'gate, a famous London prison, stands opposite the Old Bailey, at the end of Newgate Street. Its high, windowless walls long inclosed the principal prison of the city, but it is now under the control of the court of aldermen. It derives its name from having been the *new gate* to the city prior to 1218. The prison was destroyed by the fire in 1666 and rebuilt in 1780. Newgate was discontinued as a prison by the prisons bill of 1877. See Griffith's *Chronicles of Newgate.*

New'man (John Henry), Cardinal, a leader of the Church of England, afterwards, in 1845, a communicant of the Roman church and in 1879 a cardinal by appointment of Leo XIII, was born at London, Feb. 21, 1801, and graduated from Trinity College in 1820. In 1832 he published his first book, *Arians of the Fourth Century*, in which he vindicated the divine nature of Christ. In 1833 he traveled to the Mediterranean with Froude and his father for his health, and on the journey wrote most of the poems which were afterwards published as *Lyra Apostolica*, the object being to assert the spiritual power of the Church of England. Among these was world-famous *Lead Kindly Light.* On his return to England, he entered into the Tractarian movement in the Anglican church. He wrote a great many of these tracts himself, teaching that the Anglican church stands midway between the Roman Catholic and the popular Protestant. His most notable book is the *Apologia pro Vita Sua*, a history of his religious opinions. Disraeli and Gladstone characterized his withdrawal as a severe blow to the English church. As a Roman Catholic his works mainly are *Loss and Gain*, a story of a conversion; *Callista*, the story of an African martyr; *Grammar of Assent;* a volume of lectures on *Anglican Difficulties; Verses on Various Occasions;* and several volumes of sermons. In 1870 he opposed the declaration of papal infallibility as inopportune. To reward and conciliate the English moderates, of whom Newman was the head, Leo XIII made him a cardinal. He died at Edgbaston (Birmingham), Aug. 11, 1890. Consult Whyte's biography.

New'port, Ky., is the county-seat of Campbell County, opposite Cincinnati, on the Ohio at the mouth of Licking River. The city has large rolling mills, foundry, bolt works, steam mills, tile works, screen and window and door sash factories and also one of the largest lithographing houses in this country. Population 30,309. Fort Thomas, a U. S. military post, is located just above this city.

Newport, R. I., a city, is a port of entry and was one of the capitals till 1900. It is the most noted fashionable resort in America, and has magnificent private estates and villas. Its capacious and beautiful harbor is a great yacht rendezvous, and the city has many parks, fountains and monuments of great beauty. It has unexcelled public schools, and is the seat of St. George's and Cloyne House Schools and St. Mary's Academy. On Coaster Harbor are the U. S. war-college and naval training-school and a naval hospital. Newport possesses many points of historical interest, among them the state-house, built in 1742, now used as the county court-house; the Jewish synagogue (1762); Trinity Church (1725); Redwood Library (1748); and the "Old Stone Mill" pointed out as an alleged relic of the days of the Norsemen, but a subject of controversy. The town was settled in 1639 by Roger Williams and eight followers. Population 33,000.

Newport News, Va., a rapidly growing town and port of entry on James River, Hampton Roads, southeastern Virginia. It is the capital of Warwick County, is connected by electric railway with Hampton and Old Point Comfort, and is 14 miles north of Norfolk and 70 southeast of Richmond. Possessing a magnificent harbor, it has extensive ship-building plants, dry docks, grain elevators and capacious warehouses on its piers. It has a large foreign commerce, chiefly of grain. It has a large trade in peanuts. Its manufacturing interests are woodworking mills, lumber-mills, iron-works, shirt and shoe factories. Newport News although a young town, has an improved system of waterworks and electric light and gas plants. Population 45,000.

News'paper, a sheet of paper printed and distributed from time to time for the purpose of conveying news. The number of newspapers now in the world is estimated at 60,000. The bulk is issued as follows: United States 22,806; Germany 8,049; France, 6,681; Great Britain and Ireland, 9,500 besides 2,290 magazines and reviews; Austria-Hungary, 2,958; Italy, 2,757; Spain, 1,000; Russia, 1,000; Switzerland, 1,005; Belgium 956 and Holland 980; and Japan 1,000. Of the languages in which they are published, over 30,000 are printed in English; 7,500 in German; 6,800 in French; 1,800 in Spanish; and 1,500 in Italian. Newspapers first came into existence centuries before the Christian era when the reports of the Roman army were transmitted by the senate to the generals in all parts of the country, but for the actual newspaper we are indebted to Germany. In Augsburg, Vienna, Ratisbon and Nuremberg it was the practice, early in the 15th century, to issue news-sheets in the form of letters. Yet the first newspaper that at all covered the same idea as those of the present day was issued in Venice, by order of the Venetian government in 1566, and called the *Notizie Scritte.* At first they were not printed, but written out and hung up in various public places, where the people could read them on payment of a small coin. The first actual English newspaper was the *Weekly News* of 1622, edited and published by Nathaniel Butler. The London *Weekly Courant* came out in the same year. The first daily paper was the *Daily Courant*, which appeared, printed on one side only, in 1702. The daily circulation of newspapers in the United Kingdom is about 10,000,000. The regular system of advertising, which supports the newspaper and benefits the advertiser, did not begin until 1673, when the columns of a few papers were opened to regular classified advertisements. Some of the principal and largest newspapers of to-day are: In England the (daily) *Times, Daily Mail, Telegraph, Standard, Chronicle, Star, Echo, Evening News* and *Post;* in France the *Temps, Figaro, Siècle, Petit Parisien* and *Petit Journal.*

There are now published in the United States over 22,800 newspapers, of which about 2,472 appear daily. The first newspaper published in America was *Publick Occurrences* (1690), followed in 1704 by the *Boston News-Letter* and the *Boston Gazette.* At the present time a newspaper is not only a sheet for disseminating news, but apparently a leader in politics and a commentator on politics, religion, research, science, amusement, sport and social and political economy. See Baker's *The Newspaper World.*

Newt, a common salamander, represented by several distinct species, abundant in quiet waters of the United States and Europe. It is also called eft and triton. The common newt of the eastern United States (*Diemictylus*) is about three and one half inches long and is shaped like a slender lizard. It varies in color, but is commonly pale greenish above and pale yellowish below with small black specks. A variety of the common water-newt is reddish with red spots, and is found in damp places in the woods. The newts feed on insects, larvæ, snails and the like. One in California reaches a length of six inches. See Gage's *Life-History of the Vermillion-Spotted Newt*, in the *Amer. Naturalist*, December, 1891.

New'ton, Mass., a city about seven miles from Boston and almost surrounded by Charles River. It is the suburban residence of many Boston people, and manufactures cloth. silk, shoddy and glue. Population 50,000.

Newton, Sir Isaac, the foremost English expounder of applied mathematics. As a natural philosopher he stands without a peer, unless, perhaps, Helmholtz is to be admitted to this category. To save space we shall first outline his chronology and then his achievements. He was born at Woolsthorpe in Lincolnshire on Christmas Day, 1642 (old style). He early showed an inventive and mechanical genius, preferring to make windmills or kites rather than indulge in the ordinary play of children. An uncle persuaded his mother to send him to Cambridge, where he entered Trinity College on June 5, 1661. In January, 1665, he graduated; in 1667 was elected fellow of Trinity. In October of 1669 he was elected Lucasian professor of mathematics. His election as fellow of the Royal Society occurred on Jan. 11, 1672. The publication of his immortal volume, the *Principia*, made 1687 the beginning of a new era. In four years this work was practically out of print; but not until 1713 did a second edition appear. Newton began a new rôle in 1689 as representative of Cambridge University in Parliament. In 1703 was conferred the highest honor in science to which an Englishman can aspire: the presidency of the Royal Society. Only two years elapsed until knighthood was made illustrious by being conferred upon him. The year 1697 marks his departure from Cambridge and his appointment as master of the mint, an office which he filled with distinction until his death in 1727.

His work is so profoundly influencing and so thoroughly interwoven with the entire subsequent history of physical science as to make a summary of his achievements well-nigh impossible.

1. Among his earlier studies must be mentioned the brilliant series of optical experiments by which he proved white light to be composed of many simple colors and explained the color of natural bodies. Among many other important contributions to optics may be mentioned his accurate description of the phenomena of diffraction, the cause of colors exhibited by thin plates and a measurement of the wave-length of light, though in terms of the corpuscular theory.

2. Of that branch of astronomy which is known as celestial mechanics Newton practically is the creator. Having clearly formulated the fundamental principles of dynamics, he proceeded to ask whether the facts described by Kepler's laws (see KEPLER) could not be expressed in a still simpler manner. The answer is the *Principia*, where he shows that all the celestial motions are mere consequences of the one general law of gravitation that the force of attraction between any two particles varies directly as the product of their masses and inversely as the square of their distances. This law was first tested by applying it to the moon's motion about the earth, and the attraction of the earth, on this basis, was found exactly to account for the behavior of the moon. In this connection every student should be warned against the popular notion that Newton discovered the explanation of gravitation. Nothing could be further from the truth. Indeed, Newton himself expressly disclaims any such thing; and insists that, while he has succeeded in describing some of the phenomena of gravitation, he will not even venture a guess as to the cause of gravitation. It need hardly be added that to-day we apparently are as far from any satisfactory explanation of gravitation as in the days of Newton.

3. In mathematics his genius perhaps is best shown by the fact that he not only discovered the law of gravitation, but invented the differential calculus (*q. v.*) by which to discuss the facts involved. But just how the honors for the discovery of this powerful means of investigating mathematical problems are to be shared between Newton and Leibniz (*q. v.*) is a question which has perhaps not even yet been satisfactorily answered. See Brewster's *Life of Newton.*

Newton, John, American engineer and soldier, was born at Norfolk, Va., Aug. 24, 1823, and graduated at West Point in 1842. At the outbreak of the Civil War he was engaged in the construction of fortifications along the Atlantic and Gulf coasts. Having served throughout the Peninsular campaign as brigadier, at Fredericksburg he commanded a division and rose to the rank of major-general. He rendered conspicuous services at Chancellorsville and further distinguished himself at Gettysburg. At the close of the war he returned to the engineer corps of the regular army. His greatest work of engineering was the removal of the obstruction called Hell Gate (*q. v.*) in East River, New York. See BLASTING and NEW YORK CITY. After this he was given the position of chief of the engineering department with the rank of brigadier in the regular army. He retired from the service in August, 1886, and was elected president of the Panama Railroad Company in 1888. He died at New York, May 1, 1895.

Ney (*nā*), **Michel,** one of the famous marshals under Napoleon, was a cooper's son, born at Sarre-Louis, Jan. 10, 1769. At the beginning of the Revolution he was an under-officer in a hussar regiment, but merit soon brought him promotion, and after the siege of Mainz in 1794 he was made adjutant-general. He earned the rank of brigadier-general under Jourdan in 1796, and for the capture of Mannheim in 1799 was made general of division. At one time he also commanded the army of the Rhine, and after the declaration he married a friend of Napoleon and was made inspector-general of cavalry. When the empire was established, he was made marshal of France. He stormed Elchingen, and for this was created Duke of Elchingen. At Jena and Eylau he served with distinction, as in Spain and Russia. At Waterloo he led the center and had five horses shot under him, but after the surrender of Paris, in flight to Switzerland, he was recognized by a costly sword he wore, and condemned by the house of peers to die for high treason, in going over to Napoleon on his return from Elba. He was shot in the Luxembourg gardens, Paris, Dec. 7, 1815.

Nez Perces (*nā′pẽr′sāz′*), meaning pierced noses, a tribe of American Indians that settled in Idaho and were friendly to the whites. In 1877 some refused to accede to a treaty reducing their reservation, attacked settlers and soldiers, and fled to Montana and Dakota. They were overtaken, and the 350 survivors transferred to Indian Territory, and in 1885 sent to Idaho, some to the Colville Indians in Washington.

Ngami (*n′gä′mē*), **Lake,** discovered by Livingstone in 1849, is situated in the northern extremity of the Kalahari desert in British South Africa, and is 2,810 feet above sea level. Its size depends on the rainfall in the surrounding country, but its average length is 50 miles and width from 10 to 20. Its chief tributaries are the Okovango on the northwest and the Zouga on the east.

Niag′ara, Can., a town on Lake Ontario. Capacious steamers in summer cross daily to Toronto, a favorite route from Buffalo to Toronto. It formerly was called Newark. On September 18, 1792, the pioneer parliament of Upper Canada, consisting of 16 members, met at Newark (Niagara). "The annals of the North American continent present no incident in the momentous science of government to surpass in the elements of political faith, hope and heroism the opening of the first parliament of the western province." (Watson's *History.*) One of the first acts of the first session established trial by jury. In the second session (1793) it abolished slavery, the first legislative body in the Empire to do so. Four of the members were Pawling, Pettit, Swayzie and Young, and many of their descendents still live in the province. Population 1,500.

Niagara ("Thunder of Waters"), a river of North America, which forms part of the boundary between New York and Ontario. It flows from Lake Erie into Lake Ontario, a course of 36 miles, during which it makes a total descent of 326 feet, about 50 feet in the rapids immediately above the great falls and nearly 110 feet in the seven miles of rapids below. It incloses several islands, the largest, Grand Island, being nearly 10 miles long. Four miles below this island are the most famous falls in the world. The center of the river here is occupied by Goat Island, dividing the cataract into the Horseshoe (Canadian) Fall, with a descent of 158 feet, and the American Fall, 162 to 169 feet; the outline of the former is about 2,640 feet, of the latter 1,000 feet. The volume of water which sweeps over this immense chasm is about 15,000,000 cubic feet a minute. The depth of water on the crest of the falls is less than four feet, except in a few places, notably at the apex of Horseshoe Fall, where it is about 20 feet. The limestone edge of both falls is rapidly wearing away in the center. For seven miles below the falls the river is shut in between perpendicular walls of rock from 200 to 350 feet high. Just below the cataract the river is crossed by a suspension bridge for carriages and foot-passengers, and a mile and a half further down are two railroad bridges, one a cantilever, about 100 yards apart. On both shores the lands bordering the river, for some distance above and below the falls, are under the immediate control of the respective governments. New York Park at Niagara Falls embraces 115 acres, and Queen Victoria Niagara Falls Park about 154 acres. From both sides visitors clad in waterproofs are conducted under the falls. The immense water-power supplied by the falls was utilized at Buffalo by the Pan-American exposition in 1901, and to-day is generally utilized in an extensive region in the vicinity of the falls. Electric displays are a further attraction to tourists and sightseers. The illuminating apparatus consists of three batteries of 50 search-lights equipped with 30-inch and 60-inch projectors, operated by electrical engines of 300-horsepower. They throw a volume of light equivalent to that of 1,115,000,000 candles.

Niagara Falls City, N. Y., a rapidly growing town in Niagara County, on Niagara River. The city is 20 miles north of Buffalo and about 13 south of Lake Ontario. The New York Central; Erie; Lehigh Valley; Michigan Central; and other railroads converge here. All have connections into Canada. Of recent years engineering skill has, by tunnels and a hydraulic canal, utilized for practical industrial purposes the enormous water-power here obtainable, — a utility which Buffalo has taken advantage of. Niagara Falls City is the center of the electrochemical industries of the world. A model factory making shredded-wheat biscuit is an object of interest to thousands of annual tourists. School buildings number 14, and the enrollment is 4,560 pupils. Population 70,000.

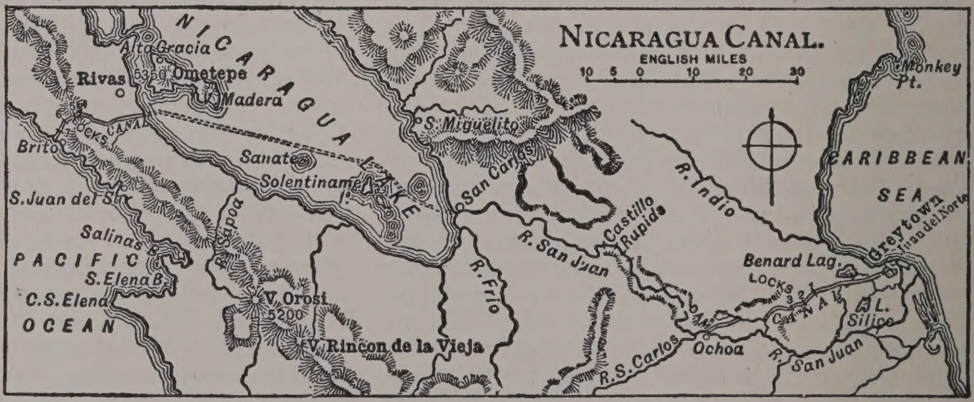
Niagara Falls City, Ontario, Can., 83 miles from Toronto, is on Niagara River in sight of the falls. It is the center of the great power-development in Canada trans-mission lines supplying Toronto. Owing to its location (a point of contact for Canadian and American railways, the only one between Montreal and Detroit), it is a noticeably busy and congested railway center Electric railways leave it for all points, including Buffalo. Several important industries, because of cheap power and excellent transportation, have been attracted to it. Among them are silverworks, a cereal plant and electrochemical industries. Three powerful plants for the development of electrical power have been installed. They represent an expenditure of nearly $20,000,000, and have about 100,000 horse-power available for transmission. Thirty thousand horse-power has already been sold for use in the United States. The ultimate development of the three companies is estimated to be 405,000 horse-power. To accomplish this 31,050 cubic feet of water every second will be used. The suspension bridge over the river was opened for traffic in 1855. Population 10,036.

Niagara Falls Park, Ont., overlooking Niagara Falls The park consists of 196 acres. To make it as attractive as possible the commissioners appointed by the government have acquired a strip along Niagara River and lands at Queenston Heights, Fort Erie and Niagara Glen, comprising 787 acres. All that expert landscape-gardening can do has been done to show to best advantage the magnificent scenic beauty of this wonderful spot. It is wonderful not alone because of the falls and the rugged grandeur of the river-banks, but because of the rarely beautiful plant life which marks the neighborhood and for many years has proved attractive to scientists. Electric roads carry tens of thousands almost daily during the tourist months to view the falls The Whirlpool and Dufferin Islands are grand and attractive. In winter the scenery is peculiarly beautiful. It is estimated that 174,000 cubic feet of water flow over the crest of Horseshoe Falls every second. In acquiring the land and in permanent improvements $1,500,000 have been spent The approaches to the park have been widened, and the shore along Niagara River is being protected with the view of forming a continuous and beautiful boulevard 33 miles in length along the river. All told, this park is one of the most attractive spots in Canada. Not a little of the credit is due to Mr. Langmuir, chairman of the commissioners, and to Mr. Wilson, the park-superintendent. The first aim of the commissioners has been to preserve the rare natural beauty of the locality and protect it from anything savoring of the unsightly or the incongruous Lord Dufferin, nearly 20 years ago, advocated a national park as a Dominion enterprise This appearing impossible and delay involving difficulties, Premier Oliver Mowat of Ontario, specially urged by Richard Harcourt one of his supporters, representing a Niagaran constituency, appointed a commission with power to expropriate land to acquire the property at and near the falls and convert it into a provincial park. The wise plan thus originated has been happily and successfully completed Thousands who have viewed the scene with awe and wonder have recalled Anthony Trollope's tribute: "Of all the sights on earth which tourists travel to see — at least of all those which I have seen — I am inclined to give the palm to the Falls of Niagara. I know of no other one thing so beautiful, glorious and powerful."

Niagara Falls, Tunnels and Power Plant. The force going to waste over the Falls of Niagara has been estimated at 7,000,000 horse-power. Such unused resources naturally attracted the attention of engineers and economists at an early day, and in 1873 a small canal utilized about 6,000 horse-power for certain mills The invention of the dynamo and the transmission of energy by electric wire gave a new impulse to the attempt to use more of the power in sight. A company was organized in 1886, and chartered by the legislature of New York, having this end in view. Experts visited Europe to study approved methods of power transmission. Work was begun in 1890 by the Cataract Construction Company, and a tunnel was dug 6,837 feet long, 21 feet high and 19 wide. It required three years and about $4,000,000 to complete the undertaking. The water is drawn from the river by a canal 110 feet wide at the end and 180 at the mouth, the canal being 1,400 feet long. The water, which is brought from the river by the canal, is carried over 14 turbine wheels, each having 5,000 horse-power; and, after passing through the turbines, it is carried away by the tunnel. Each turbine is connected with a dynamo of 5,000 horse-power, and the electric current is thus brought to Buffalo, 18 miles distant, where it is used for lighting the city, operating tramways in the streets, pumping water for city use and running machinery in various factories. It is expected that the power thus generated will be distributed over all the western part of New York by improved processes of transmission. In 1901-2 the original plant was more than duplicated by the construction of a new wheel-pit connected with the old one by a passage 130 feet below the surface. The discharge tunnel was extended to the new pit, making the tunnel 7,437 feet long. In the new power-house and pit were installed 11 turbines and dynamos, each unit having 5,000 horse-power. So the total production at this point became 105,000 horse-power instead of 70,000 as previously.

Nibelungenlied (*nē′bĕ-lo͝ong′ĕn-lēt*), a German epic, ranking as one of the greatest poems of the world. The oldest elements of the work must have been long current in the form of popular songs; but the incidents of the story seem to have been fused into one narrative before the 12th century, though by whom it was done is unknown. The story of the poem is as follows: Siegfried, the son of the king of the Netherlands, becomes possessor of the fabled wealth of the Nibelungs, which carries with it evil to its possessor. He marries Kriemhild, sister of Gunther, king of Worms, and helps Gunther to win Brunhilde of Iceland. Then there is a dispute as to whether Siegfried or Gunther be the greater, and Brunhilde induces Hagen to murder Siegfried. Kriemhild after some years marries Etzel (Attila), king of the Huns. After Kriemhild became possessor of the Niebelungen wealth, Hagen took it from her and sank it in the Rhine. After several years Kriemhild, still mourning for Siegfried and desiring to be revenged for his death, asked her brother to visit her at her court. This he did, with 11,000 armed Burgundians, and the remainder of the poem is devoted to the wars and sufferings of the Burgundians. See English translations by Lettsom, Foster, Barham and Birch. See also Carlyle's *Miscellanies*, Vol. III.

Nicæa (*nī-sē′ȧ*), a city of ancient Bithynia in Asia Minor, lies on the eastern shore of Lake Ascania. It was built in 316 B. C. by Antigonus and named Antigoneia, but was changed to Nicæa by Lysimachus in honor of his wife. It is famed as the seat of two ecumenical councils: the first held by Emperor Constantine in 325 A. D.; and the second called by the Empress Irene in 787.



Nicaragua (*nē′kȧ-rä′gwȧ*), a Central American republic, stretches across the isthmus from the Caribbean to the Pacific and lies between Honduras on the north and Costa Rica on the south. It has an area of about 49,200 square miles. The Central American Cordillera extends through the country from northwest to southeast, not far from the Pacific coast. From these the surface sinks rapidly westward, and the country is studded with large lakes, the largest being Nicaragua (115 miles long and 45 broad) and Managua (35 miles long and 20 wide). This tableland is also marked by isolated peaks and volcanic cones. On the west lie Managua the capital (population 35,000); Leon, Granada, Chinandega, Rivas and the harbors of the Gulf of Fonseca, Salinas Bay and Corinto; and on the east the harbor of Greytown on San Juan River. The principal rivers are the Coco (350 miles), San Juan, Bluefields and Rio Grande. Minerals are found, but only of late have they begun to be worked. In 1898 the shipment of gold-dust amounted to 16,242 ounces. The rich soil yields corn, sugar, cocoa, rice, tobacco and indigo. The natural products are mahogany, rosewood, logwood, fustic, sandalwood, india-rubber, dye woods, medicinal plants and gums. The chief exports (besides gold) embrace coffee, rubber, bananas, timber, cattle and hides.

Nicaragua was a precolumbian center of civilization. Columbus sailed along the coast in 1502, and in 1524 Granada was founded by Spaniards, who had entered two years before. From 1560 to 1821 the state was a dependency of Guatemala, but in that year became independent and so remained for sixteen years. Then until 1865 it had a troublesome and warlike time, but since then it has made great strides toward peace and prosperity. In 1894 a new constitution was proclaimed, which was amended in December, 1896. By this the legislative power is vested in a congress of one house. Population, including uncivilized Indians, 500,000 Consult Bancroft's *History of Pacific States*. See AMERICA, CENTRAL.

Nicaragua Canal. The plan to cut a ship-canal through Central America by way of San Juan River and Lake Nicaragua was taken up in earnest in 1884 and a treaty made between the United States and Nicaragua. The Nicaragua Canal Company was formed and the canal was begun at Greytown in 1889. But, after expending $4,000,000, the company found the burden greater than they had anticipated, and sought an appropriation from Congress of $100,000,000, with provision for government supervision. Failing in this, the work ceased, and finally the concession from the government of Nicaragua lapsed. In 1897 the United States government took up the question of the construction of a canal, and a commission was appointed to survey and report the most practicable route and estimate the cost of construction. In 1899 a new commission was authorized to make further inquiry and report, considering both the Nicaragua and the Panama route. The Nicaragua route was recommended, and the cost of the canal was estimated at $118,000,000 to $135,000,000. In 1903, however, the Panama (*q. v.*) route was adopted, the United States purchasing the properties of the Panama Canal Company for $40,000,000.

Nice (*nēs*), a French seaport and the largest town of the Alpes-Maritimes department of France, lies on the coast 140 miles from Marseilles. Owing to its southern sea-exposure and shelter by the hills on the north, it has long been a famous winter resort for invalids. The city is divided into three parts — the New Town, the Old Town and the Port. The chief public buildings are the cathedral, church of Nôtre Dame, natural history museum, art gallery, library, observatory and casino. Its main export is olive-oil. The town was founded by a colony from Massalia (Marseilles) and became subject to Rome in the 5th century B. C. It once was in the hands of the Saracens, and after being an independent city acknowledged the counts of Provence and the house of Savoy in 1388. In 1543 it was pillaged by the Turks, and in 1860 was finally ceded to France by Sardinia. In 1887 it was visited by a destructive earthquake. Population 142,940. See Nash's *Guide to Nice.*

Nich'olas I was born of noble Roman parentage, and elected pope in 858. He was zealous in upholding the power of the papal court. He died in 867. Pope Nicholas V (1397–1455) was one of the great scholars of his century, and deserves eternal gratitude for founding the Vatican library.

Nicholas I of Russia, third son of Paul I, was born at St. Petersburg, July 7, 1796; was carefully educated; and later devoted his time to military studies and political economy. He traveled over Europe, marrying the oldest daughter of Friedrich Wilhelm III of Prussia. Upon the resignation of his older brother he ascended the throne in December, 1825. In 1828 war with Persia began, and at its close occurred a war with Turkey. This was followed by the rising of Poland, which he subdued, reducing the kingdom to a mere province. His rule now became despotic and fierce. He remained inactive until the Hungarian rebellion in 1848–9, when he was called in to aid Austria. This strengthened him with the European powers, and he began to think of absorbing Turkey. The opposition of the western powers led to the Crimean War, during which he died on March 2, 1855.

Nicholas II. of Russia, though personally a weak man, will enjoy a certain distinction in history as the last of the czars. He was born in St. Petersburg, May 18, 1868, became czar November 1, 1894, and on November 26 married the German princess, Alix of Hess-Darmstadt. He instituted the first Hague conference in 1898 but although he was personally humane and advocated a more liberal policy towards certain classes of his subjects who had suffered because of their nationality or their faith, he exercised his autocratic powers until forced in August, 1905, to accept the Duma and a constitution. The complete overthrow of the autocracy and the forced abdication of Nicholas came in March, 1917. With the fall of the Empire, he was imprisoned, exiled to Siberia and later reported assassinated by the Bolsheviki (*q. v.*).

Nicholas, St., the patron saint of Russia, whose life is wrapped in obscurity. He is supposed to have lived about 300 A. D. He was bishop of Mira in Lycia, and was imprisoned under Diocletian and released under Constantine. In Catholic countries St. Nicholas is especially the patron of the young and particularly of scholars. In England his feast was publicly celebrated in ancient times. Santa Claus is a corruption of the name, introduced into England from America; the old Dutch settlers of New York kept a Santa Claus holiday. St. Nicholas also was the patron of merchants, sailors and travelers; and, as he was prayed to for protection against robbers, the term "clerks of St. Nicholas" came, oddly enough, to be a cant name for robbers.

Nicias (*nish'i-as*), an Athenian statesman and general of the Peloponnesian war, was the son of the wealthy Niceratus. After the death of Pericles, he was the political opponent of Cleon and later of Alcibiades. In 427 B. C. he defeated the Spartans and Corinthians, and ravaged Minoa, Melos and Locris. In 424 he ravaged Cythera and part of Laconia. In 415 he was appointed one of the commanders against Sicily, and in the autumn laid siege to Syracuse. At first successful, later his fleet was destroyed, his army began a retreat, and he was captured and put to death in 413 B. C. See Plutarch's *Life of Nikias* (edited by H. A. Holden).

Nick'el, a malleable, ductile and tenacious grayish-white metal, was discovered by Cronsted in 1751, but was long before that time used in alloys by the Chinese. Yet previous to 1879 it, being difficult of fusing, was only used as an alloy in German silver. In that year Fleitmann discovered that mixed with ⅛ of one per cent. of magnesium it could be easily rolled and drawn. The metal does not readily alter by expo sure, but it easily dissolves in nitric acid. It is now used as an alloy with copper and zinc in German silver and for plating iron and steel. In some alloys it is used for coins and also in steel for armor plates, cannon, etc. The ore is found in Canada, Norway, Germany, Hungary, France and the United States.

Nic′otine. See Poisons.

Niebuhr (*ne′bōōr*), **Barthold Georg,** historian, was born at Copenhagen, Aug. 27. 1776. After careful study at Kiel, he studied natural science at London and Edinburgh. In 1800 he married and entered the Danish state service, from which he resigned in 1806 to enter the Prussian state service. From 1810 to 1812 he lectured at the new University of Berlin on Roman history. From 1816 to 1823 he was German ambassador to the papal court. He died at Bonn, Prussia, Jan. 2, 1813. Some of his works are *Lectures on the History of Rome*, *Lectures on Ancient History* and *History of Byzantium*.

Niemen (*nē′men*), a river in western Russia, rises a few miles south of the city of Minsk, divides into two branches below Tilsit, and empties into Kurisches Haff by four mouths to each branch. It is 500 miles long and navigable as far as Grodno.

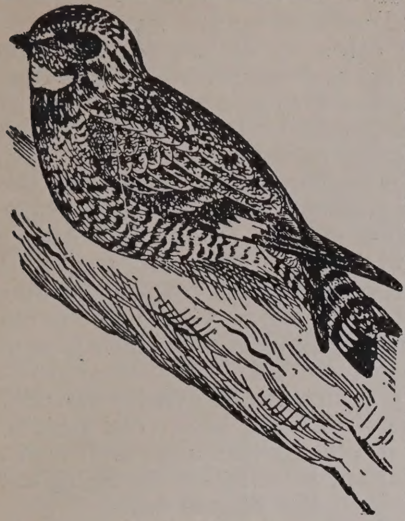
Nietzsche, Friedrich Wilhelm (1844-1900), a German philosopher who held that the law of the survival of the fittest (v. Evolution) makes for the best and highest development of man and society, and that sympathy for weakness and suffering should not be permitted to stand in the way of the development of strong and efficient nations and strong men; what he called "Übermenschen," supermen.

Ni′ger, a remarkable river system of western equatorial Africa, emptying into the Gulf of Guinea. It was thought to be a tributary of the Nile; then of the Kongo; and then supposed to terminate in an inland basin; but the work of Mungo Park and others has settled all but 70 or 80 miles of its length. The Niger proper is 2,600 miles long, and its drainage basin has an area of 1,023,280 square miles. The headwaters are in the present states of Samory, near the headwaters of the Senegal; but the Tembi, rising in the Loma Mountains, 3,000 feet above the sea, is the actual source. From the source to Timbuktu the river has only a few small tributaries, but some distance below here it is joined by the Benuē or Mother of Waters, traveling 860 miles from the east. Thence the river flows to its mouth, where a beautiful delta is formed. The navigation is free, but the trade, chiefly in palm oil, is under the control of Great Britain. See Joseph Thomson's *Mungo Park and the Niger*.

Niger′ia, Northern and Southern (formerly the Niger Territories, until Jan. 1, 1900, administered by the Royal Niger Company, but now under the control of the British Crown). Nigeria covers an area of 310,000 square miles, with a population of 25 millions. It is bounded on the north by the French Military Territory, on the east by Kamerun, on the south by the Gulf of Guinea and on the west by Dahome. For administrative purposes this vast region is divided into two governments, those of Northern and Southern Nigeria. They embrace the area once the Fula or Sokoto empire, with the subordinate sultanates of Gandu, Kano, Bornu, Benin, etc., watered by the Niger and its tributaries. On the Gulf of Guinea the territories have a seaboard of about 120 miles in length, on which are the towns Akassa, at the mouth of the Niger, the British naval headquarters; Bonny, Wari, Old Calabar and New Calabar. A military force is stationed in southern Nigeria, partly at Asaba and partly at Akassa. The capital of Northern Nigeria is Zungeru, a new one in the direction of Kano, eastward toward Bornu, in a healthier and higher region more suitable for Europeans. Northern Nigeria with 256,400 square miles has a large trade to the mart of Kano by caravan from Salaga in the west, Tripoli, Morocco and the Sahara in the north and Lake Chad and Wadai in the east. The imports are principally cottons, hardware and salt. A light railway runs from Zungeru to Bari-Juko, twenty-four miles, and the survey for its extension to Zaria and Kano is finished. Five stern-wheel steamers, three steam launches and a steam pinnace belonging to the government are on the Niger, and the telegraph runs from the Lagos frontier to Jebba and thence to Lokoja, Zungeru, Zaria and other points, a total of 1,701 miles.

Southern Nigeria has an estimated area of 49,700 square miles and population of 3,055,600, with the seat of government at Old Calabar. Forcados and Old Calabar are joined by telegraph with Lagos, Bonny, Brass and other points, a total of 195 miles. Spirits are prohibited in Northern but not in Southern Nigeria. The chief products are rubber, gum, hides, ivory, palm oil and palm kernels. Northern Nigeria is rich in agricultural resources, cotton being largely grown and now manufactured. Here are found the Hausa race, who carry on the internal trade by means of caravans in Central Sudan.

Night′hawk, an American insect-catching bird related to the whip-poor-will, a member of the goatsucker family. It is quiet all day but flies at dusk and is often called the bull-bat. It is common in many parts of the United States from May to October, and may be seen at nightfall, high in the air, sailing back and forth in search of flying insects. It is about the size of the robin, of a dark color mottled with gray, and can always be recognized from its wide wing-spread, making it seem longer than the robin, and its white wing spots, conspicuous in flight, distinguishing it from the whip-poor-will, for which it is often mistaken. It is sometimes called night-jar, and also goes by the name of mosquito-hawk; names more apt than nighthawk, for it is far removed from being a hawk save in keenness of vision. As a rule this bird hunts in small companies of his fellows; one never tires of watching it in its hunting. In the evening, high, high overhead the bird sails along, from height and ease making suddenest drop down to lower atmosphere, where its wonderful vision has discovered a fly, mosquito, beetle or moth. During the heat of the day it rests, sitting motionless on limb, wall or lichen-covered rock,—any place where it will be inconspicuous. The nest is made in hollow rock or on bare ground, and there are two speckled gray eggs. These eggs are sometimes found on a house-top in the city. Frequently after nesting-season is over, night-hawks gather in towns, hunt the myriad insects about street-lights, resting on roofs by day. They are widely distributed in North America. When they migrate, they travel in large flocks. The sound made by them is another way in which to distinguish them from the whip-poor-will; as they fly their call is a sharp "pee-ent! pee-ent!" and when they make a drop through the air and then turn suddenly upward, there is heard a peculiar "boo-oom, boo-oom"— thought to be caused by the action of the air on the outstretched wings and tail. In localities where they are numerous the evening air resounds with the nighthawk's boom, which, heard at a distance, betrays the unseen bird. See Chapman: *Bird Life.*

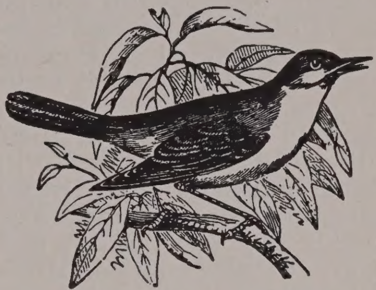


NIGHTHAWK

Night′ingale, a bird famous on account of its brilliant song, which for quality and variety is not exceeded by that of any other bird. The song of the nightingale has been a theme of poets for ages. Homer wrote of the "sweet, tawny nightingale" that "deep in leafy shades complains, trilling her thick-warbled strains." Milton called the nightingale "most musical, most melancholy bird." Coleridge wrote:

" . . . . . the merry nightingale
That crowds, and hurries, and precipitates,
With fast, thick warble his delicious notes,
As if he were fearful an April night
Would be too short for him to utter forth
His love-chaunt, and disburden his full soul
Of all its music."

This bird belongs to the group of Old World warblers, and is not found in the New World. Its range is central and western Europe; it is abundant in Spain and Portugal, and abounds in portions of the midland, eastern and southern counties of England. Thicket and hedge and wet meadow are its favorite haunt. It is during the nesting season the male pours forth his glorious song, to be heard from the middle of April to perhaps a little later than the middle of June. Both day and night he sings. Apart from the wonderful song, the utterance of the nightingale is not musical; Mitchell, in *Cries and Call-Notes of Wild Birds*, declares the common alarm cry very like the croak of a frog, and speaks of its call as a "squeak" and of a high "distress-note." The bird is about the size of the hedge sparrow; graceful of form; in color, reddish-brown above and grayish-white below. Its loosely constructed nest is usually built on the ground, sometimes in low brush. In rare beauty of song, our hermit thrush has been compared to the nightingale. Our cardinal bird (cardinal grosbeak) is sometimes called the Virginia nightingale.



NIGHTINGALE

Nightingale, Florence, an English philanthropist, daughter of William Edward Nightingale, was born at Florence, Italy, in May, 1820, and during the course of her study of science, mathematics and classics with her father, showed a great desire to lessen human suffering, so much so that in 1844 she began a tour of Europe, looking into the condition of hospitals, and in 1851 entered upon a course of study as a trained nurse at Kaiserswerth on the Rhine. On Nov. 4, 1854, the year of the outbreak of the Crimean War, she arrived at Scutari with thirty trained nurses and took charge of the military hospitals until the close in July of 1856. She then turned her attention to the improvement of the sanitary condition of the army, and wrote many books and papers on that and kindred subjects, among them *Notes on Nursing*, *Notes on Hospitals*, *Life or Death in India*, etc. She was the founder of St. Thomas' Home in London for the training of nurses and the recipient of a cross from the late Queen Victoria and a bracelet from the sultan of Turkey. Longfellow praised her in *Santa Filomena.* See *Life* by S. A. Tooley. She died Aug. 13, 1910.

Night′-Schools. This term is applied to schools giving instruction only in the evening or to the evening classes of any school.

The pupils are usually persons who are prevented from attending day schools by their regular occupations.

Night-schools are of great variety, their nature in any particular locality depending upon local needs. Before the days of compulsory education many persons took advantage of this means of remedying deficiencies in their elementary education. At the present time there is much more demand for evening classes in high school grade of work and for courses in trade and technical schools. Evening schools are of earlier origin and more highly developed in Europe than in America. In many cities good high-school courses are now offered in evening schools. Many of the best trade and technical institutes give evening instruction equal in efficiency to that given in their day classes, as Pratt Institute, New York; Maryland Institute, Baltimore; and Drexel Institute, Philadelphia. Most business and commercial schools, many Y. M. C. A.'s and some law schools give evening courses. Much of the university extension and university settlement work is done in this way.

Night′shade, an order of tropical and subtropical herbs and shrubs and a few trees, having for the most part a heavy, offensive odor. There are over a thousand species, the greatest number being found in Central and South America. The leaves have the property of putting to sleep, but lose this when boiled. The typical nightshade has a slender stem, pointed oval leaves, white clustered flowers and small rounded black berries. The several kinds are known by different names — the woody nightshade as bittersweet, deadly nightshade as belladonna, and enchanter's nightshade as circæa.

Ni′hilist, now used as designating a Russian revolutionist. It was first so introduced by Turgenieff, who defined a nihilist as one who "bows before no authority of any kind, and accepts on faith no principle, whatever veneration surround it." The nihilist believes in no institution of government, progress, or art, unless it be by and for the benefit of the masses. The movement with which the nihilist is identified had its origin in 1860, when the proposed freeing of serfs was prevented by the influence of the serf-owners with the czar. From this time the nihilists organized societies to force the adoption of a new constitution, and in their efforts resorted to violence repeatedly, going so far as to kill czar Alexander II on March 13, 1881. For alleged crimes previous to this hundreds were sent to Siberia in exile, while for the murder of Alexander II many were hanged and hundreds exiled. See *Russia and the Siberian Exiles* by George Kennan.

Nijni-Novgorod. See Novgorod.

Nikko (*nēk′kō*), one of the chief religious centers of Japan, is beautifully situated in the Nikko Zan (Mountains of the Sun's Brightness), about eighty miles northwest of Tokio. A Shinto temple seems to have existed at Nikko from time immemorial, and in 767 its first Buddhist temple was founded; but the main celebrity of the place is due to the sepulchers and sanctuaries of Iyeyasu and Iyemitsu, the first and third shoguns of the Tokugawa dynasty. Iyeyasu was buried here with amazing pomp in 1617. His tomb lies forty steps higher up the hills than the numerous magnificent temples and other structures which cluster around it. Above the tomb, the hill on which it stands is covered to the summit with trees of various tints, while below are a vast number of temples, shrines, pagodas, monuments and religious edifices of all kinds, to which thousands of pilgrims resort every year, and by whose gifts Nikko has been thus beautified, making it one of the most attractive spots in all Japan, in addition to being the great sanctuary of the Shinto cult.

Nile, a great river of Africa, the ancient Nilus, the second longest river in the world and the sacred river of the Egyptians. It has its source at the southern end of Lake Victoria Nyanza, and, pouring over Ripon Falls, runs 300 miles to join Albert Nyanza, 20 miles from which it falls 120 feet into a deep gorge, and flows in a northerly direction into the Mediterranean. At 7½° N. the channel is divided in two, only to join again at 9½°, to be called the White Nile, flowing thus to Khartum, where it is joined by the Blue Nile, 950 miles long. These augmented waters flow for 200 miles before they are joined by the Black Nile. Below Khartum the navigation is impeded and dangerous on account of six rapids. The Nile begins to rise in April and reaches the highest point in September, often causing disastrous floods. The ancients believed that the river rose in Morocco and flowed underground for several days' journey, rising to the south of Ethiopia, thence passing northward. The Emperor Nero first began the investigations of the source of the river by sending out two expeditions, but they were not completed in their present form until the explorations by Speke in 1858, by Baker and Schweinfurth in 1868–71 and by Stanley in 1875 and 1889. The total length of the Nile from Victoria Nyanza to the Mediterranean is 3,400 miles, although the river actually draws its water as far as 250 miles south of Lake Victoria. See the writings of the explorers named.

Nile, Battle of the, was fought on Aug. 1, 1798, in the Bay of Abukir, at the mouth of the Nile, 13 miles northeast of Alexandria. Nelson gained a great victory over the French fleet, which was not only defeated, but almost annihilated. In 1799 Napoleon defeated a Turkish army here, and in 1801 Sir Ralph Abercromby's British expedition landed in the face of the enemy, and he met his death.

Nil'sson, Christine, a Swedish prima donna and operatic singer, was born near Wexio, Sweden, Aug. 3, 1843. A magistrate was impressed by her singing at a fair in 1857, and sent her to Stockholm and Paris for a musical education. She appeared first in Paris in *La Traviata* in 1864 and in London in 1867, and was soon ranked among the foremost singers on the modern stage. In 1872 she married M. Rouzaud, and in 1887 the Count di Miranda.

Nîmes (*nēm*), the capital of Gard, a French department, lies in the valley of the Cevennes. It has narrow, crooked streets, and its principal interest lies in the Roman remains; there being the Corinthian Maison Carrée, now a museum; an amphitheatre seating 20,000; a mausoleum, baths and two gates. The city is the seat of large manufactories of silk, cotton, carpets, shawls, wine, brandy etc. Nimes was settled from Marseilles and became one of the great cities of Gaul. It was in the hands of the Visigoths (465), Franks (507) and Saracens (725); then it belonged to Aragon; but finally it came into the possession of France in 1259 by the treaty of Corbeil. Population 80,605.

Nin'eveh, the famous capital of the Assyrian empire, called Ninâ on the monuments, now a mass of ruins called **Kuyŭnjik.** Though the city appears to have been entirely destroyed in the fall of the empire, the name of Nineveh continued, even in the middle ages, to be applied to a site opposite Mosul, on the east bank of the Tigris, where artificial mounds and traces of an ancient city wall gave evidence of fallen greatness. The most elaborate defenses, such as outworks and moats, can still be traced on the southern half of the east side; for this part of the city was most open to attack. It was not until the excavations of Botta in 1842 and of Layard in 1845, that anything definite was learned of the life and history of Assyria from its monuments and library. Not only have the magnificent remains of Assyrian architecture and sculpture been laid bare, but accompanying cuneiform inscriptions throw much light on the history of the city and its buildings. Nineveh proper was only one of a group of cities and royal residences whose ruins still mark the plain between the Tigris, the Great Záb and the Kházir. Nineveh proper appears to have been the chief seat of empire. But when the book of *Jonah* speaks of Nineveh as a city of three days' journey, it is plain that the name is applied to the whole group of cities between the Tigris and the Záb. See works of Layard, Botta, Flandin, Schrader and Keilinsch. See also *Assyrian Discoveries* by George Smith.

Ning'-Po' (City of the Hospitable Waves), a treaty port of the province of Che-Kiang in China, lies 16 miles from the mouth of the Ning-Po River; is surrounded by a wall 25 feet in height and 16 in thickness. It is a free port, exporting sedge hats, green tea, mats, cuttlefish, silk goods and raw cotton, and importing opium, cotton and woolen goods, tin and iron, kerosene oil, sugar, tobacco and indigo. Population estimated at 400,000.

Niobe (*nī'ō-bē*), according to Homer's story of mythology, was the daughter of Tantalus and wife of Amphion, king of Thebes, to whom she bore six sons and six daughters. She was proud of her children, and despised Latona, who had only two. For this, Latona caused her children to slay all Niobe's with arrows, and Niobe herself was turned into stone on Mount Sipylus from which tears flowed all summer. A statue of Niobe and her children was discovered in Rome in 1583.

Nip'igon, a lake and also a river and a bay, in northwestern Ontario, Canada, through which river and bay the waters of the lake flow to Lake Superior from the north. The lake lies about 25 miles north of the northernmost part of Lake Superior. It is 70 miles long from north to south and 45 miles wide from east to west. It is surrounded by lofty shores, abrupt and precipitous in many places. Its shores being indented by many bays measure, it is estimated, nearly 600 miles in extent. It lies about 800 feet above the level of Lake Superior. Its waters are fed by many mountain streams, and being very deep and cold it is celebrated for the excellence of its fish. Being thickly studded with islands, it has become a favorite resort for sportsmen and others from the northern United States. It is said to have in January a mean temperature of but seven degrees above zero, or that of Godthaab in Greenland, and in July the mean temperature of San Francisco. By some authorities the name is spelled Nepigon.

Nippur', a city of Babylonia, situated between the Tigris and the Euphrates, in the neighborhood of 100 miles southeast from Bagdad and about 50 miles from the site of ancient Babylon. The mound which covers the ruins of the ancient city was first made the object of study by Sir Austen Layard in 1851. The expedition sent out by the University of Pennsylvania began work upon this mound in February, 1889. The excavations so carried on revealed the site of a city of great importance, one of the chief commercial and military centers of the ancient east. The University of Pennsylvania possesses a large and important collection of relics brought from this site.

Ni'ter. See SALTPETER.

Ni'tric Acid (HNO_3), is one of the most important acids. It was formerly, and sometimes is still, called *aqua fortis*. It is prepared by distilling a mixture of saltpeter, usually the cheaper Chile variety (sodium nitrate), with sulphuric acid. The strongest nitric acid is about half again as heavy as water, and is an intensely corrosive liquid, which is colorless when pure, but is usually colored yellow by the presence of lower oxides of nitrogen. It fumes in the air, colors the skin yellow, producing painful burns, and usually dissolves or oxidizes all the commoner metals except gold and platinum, with the violent expulsion of choking, red fumes. Aluminum is dissolved but slowly by it, and in some instances the strong acid must be diluted with water before it will act upon a metal. Dilute nitric acid is generally less active the more water it contains. Strong nitric acid, mixed with sulphuric acid, acts upon cotton and glycerine to form the explosives, guncotton and nitroglycerin. Nitric acid is extensively used in chemical operations, particularly to dissolve metals and to oxidize substances. When the metals or their oxides or carbonates dissolve in this acid, salts called nitrates are produced. Mixed with hydrochloric acid, nitric acid forms *aqua regia* (royal water), which is capable of dissolving gold and other substances that are not attacked by a single acid. Nitric acid is also used to some extent in medicine. HORACE L. WELLS.

Ni′trogen is an elementary gas which in the free state forms nearly four fifths by volume of our atmosphere. In combination with other elements, nitrogen is a necessary constituent of all plants and animals, and it forms a very large number of important compounds, both natural and artificial. Its presence in the atmosphere was discovered in 1772 by Rutherford, at that time professor of botany in the University of Edinburgh. It was more particularly investigated soon after by Priestley, Scheele, Cavendish and Lavoisier. It is a colorless, tasteless, odorless gas, and was formerly regarded as permanent and incondensable; but it can be liquefied at a sufficiently low temperature. Nitrogen is slightly lighter than atmospheric air, and is fourteen times as heavy as hydrogen. It is but slightly soluble in water, one hundred volumes of water at ordinary temperature dissolving only one and a half volumes of nitrogen.

While nitrogen is a constituent of all plant and animal organisms and of many important compounds, it is, in a free state, rather inert toward other elements and does not readily enter into direct combination with them. It is not combustible, nor does it act in the atmosphere as a supporter of combustion, as a lighted taper plunged into a jar of nitrogen will at once be extinguished. Nitrogen is not poisonous, since it is breathed freely along with oxygen by all animals; but it cannot support life, and an animal placed in it will die from suffocation for want of the oxygen necessary for breathing. Its function in the atmosphere seems to be mainly that of diluting the oxygen with which it is there associated. Although nitrogen forms about 79.1 per cent. of the total volume, and 77 per cent. of the total weight, of the atmosphere, the free gas cannot be taken up by plants directly, but it is combined with other elements through the agency of certain bacteria that exist in nodules on the roots of leguminous plants, that is, those that are related to clover, peas etc. Other plants, particularly grasses and grains which require much nitrogen, are dependent upon the combined nitrogen of the soil; hence nitrogenous fertilizers, such as dried blood, ammonium salts and nitrates, as well as ordinary manures, are important in agriculture for use on soils containing insufficient nitrogen. Two of the important compounds of nitrogen are nitric acid and ammonia. This element also is an essential constituent of the proteids or albuminoids, which make an important part of our food, as well as of the alkaloids, most of the dyes and a host of other natural and artificial compounds. H. L. WELLS.

Nitrogen=Gathering Crops all belong to the family of leguminous plants or *Leguminoseæ*, having irregular, conspicuous flowers or clusters and seeds in pods. The bean and pea are good examples. The clovers do not seem at first sight to answer this description. All have abundant foliage, root deeply, and are remarkable for their ability to take pure nitrogen from the soil and store it up in form available as plant and animal food. This is done by means of germ-like organisms which grow inside of tiny lumps on the roots. These nodules can be seen by washing the earth from the roots of any of these plants, and range in size from that of a pin-head to that of a small pea. These nodules will not appear on clover roots if none of the germs exist in the soil. Such a soil can now be inoculated with the germs by applying a solution containing them. The germs are put up in dry form like yeast-cakes and can be obtained from the Department of Agriculture, and be dissolved to make the solution. The nitrifying action goes on best in well-ventilated soils. In poorly drained soils just the opposite process, denitrification, is apt to occur, reducing plant food to unavailable simple nitrogen. The subject of nitrifying bacteria is very complex, as they possibly also exert a fermenting influence on the minerals of the soil. Experiments have shown that an acre of cowpeas at the Louisiana Experiment Station produced 65 pounds of nitrogen, and an acre of crimson clover at Cornell University produced 156 pounds, 30 of which were in the roots. Other clovers produce a greater proportion in the roots, as the mammoth clover, with 78 pounds in the roots out of a total of 146 pounds. It grows best in wet soils that usually are deficient in nitrogen, and so leaves much in the soil when the tops are cut off. Red clover, the usual variety grown on loams and heavier clays, contained in the experiment, forty pounds in the roots out of a total of 103 pounds. A low estimate of the market value of nitrogen is between fifteen and twenty cents a pound.

Nitroglycerin (*nī-trō-glĭs'ēr-ĭn*), a heavy oily explosive liquid, colorless in its pure state, which is formed by dissolving glycerin in equal parts of nitric and sulphuric acids and pouring the mixture into water. The scientific name of this liquid is *Glycerol Trinitrate.* Its chemical composition is $C_3H_5(NO_3)_3$. Nitroglycerin has a specific gravity of 1.6 and is practically insoluble in water. It freezes at fourteen degrees Fahrenheit, and evaporates with gradual heating. The process was discovered in 1846 by an Italian chemist named Sobrero, but nitroglycerin was not used for blasting purposes until Nobel, a Swedish engineer, so used it in 1861. The danger of explosion in handling it is so great that it is chiefly used in mixtures with powdered substances, especially dynamite. It burns slowly in the open air, but explodes when given a hard blow or brought into contact with a red-hot iron. Nitroglycerin decomposes at 150 to 180 degrees Fahrenheit, and explodes at 450 degrees. If it is solidified at from forty to forty-five degrees Fahrenheit, there is danger of explosion from a breakdown of the crystals in this form. It is much more powerful than gunpowder. Nitroglycerin is a poison with a sweet burning taste. In minute doses it is sometimes administered in treatment of certain diseases of the heart and stomach. It is often called glonoin in medicine.

Nivelle, Robert George, a distinguished French General who served during the World War, was born at Tulle in 1856, and educated at St. Cyr and the École Polytechnique. He was of French-English parentage, perhaps inheriting his professional trend from his father, who was an officer in the French army. He had served in the Chinese Wars previously to his World War service. During the course of this struggle it became necessary to hold Verdun. If the French retreated from this stronghold of 1916, it was felt that the nation might lose heart and acknowledge defeat. General Petain was in command, but yielded control to Nivelle, who had entered the World War as a colonel of artillery, and was now first in command under the older general. Nivelle organized his defensive forces, and his army held. He issued the order in the second battle of Verdun, which created the famous saying "They shall not pass." Wide spread his fame throughout France. He was made Commander-in-Chief of the French armies, holding power over General Haig, the British commander. Then, in an effort to drive the German forces out of France, he led a general offensive attack, in the execution of which the number of killed and disabled outweighed the advantage. The failure came to be considered a matter of poor policy, and he was relieved of command in 1917, and sent to Algeria on military duty. He became Governor-General of Algeria. He died there on March 21, 1924.

Nobel Prize, The, an internationally distributed prize awarded for distinguished achievement in Physics, Medicine, Chemistry, Literature and Peace. Alfred Bernard Nobel, born at Stockholm on October 21, 1833, son of an inventor, is the founder of these prizes. He himself invented dynamite, and is said to have rivalled Edison, although he worked in an entirely different field. He died at San Remo, Italy, on December 10, 1896. He left a fund of $9,000,000, the interest on which was to be distributed annually by specified agencies to the persons considered to have most greatly distinguished themselves in the five classes. No one may apply for the Nobel Prize since it is an honorary award made on recommendation of scholars or societies of eminence. The income from the fund amounted to prizes of $46,350 each in 1930. The awards since 1920 have been given as follows:

Physics

1920	C. E. Guillaume	Switzerland
1921	Albert Einstein	Germany
1922	Niels Bohr	Denmark
1923	R. A. Millikan	America
1924	K. M. G. Siegbahn	Sweden
1925	Jas. Franck	Germany
	Gust. Hertz	Germany
1926	Jean B. Perrin	France
1927	Arthur Compton	America
	C. T. R. Wilson	England
1928	O. W. Richardson	England
1929	Duc L. V. de Broglie	France
1930	Chandrasekhara Venkata Raman	India
1931		No Award
1932	W. Heisenberg	Germany
1933	P. A. M. Dirac	England
	Erwin Schroedinger	Germany

Chemistry

1920	Walther Nernst	Germany
1921	Frederick Soddy	England
1922	F. W. Ashton	England
1923	Fritz Pregl	Austria
1924		No Award
1925	Richard Zsigmondy	Germany
1926	T. Svedberg	Sweden
1927	Heinrich Wieland	Germany
1928	Adolph Windaus	Germany
1929	A. Harden	England
	H. van Euler-Chelpin	Sweden
1930	Hans Fischer	Germany
1931	Carl Bosch	Germany
	Friedr. Bergius	Germany
1932	Irving Langmuir	America
1933		No Award

Medicine

1920	A. Krogh	Denmark
1921		No Award

1922	A. V. Hill	England
	O. Meyerhof	Germany
1923	F. G. Banting	Canada
	Dr. J. J. R. McLeod	Canada
1924	W. Einthoven	Netherlands
1925		No Award
1926	Johan Fibiger	Denmark
1927	J. Wagner Jauregg	Austria
1928	Dr. Ch. Nicolle	France
1929	F. G. Hopkins	England
	C. Eijkmann	Netherlands
1930	Dr. Karl Landsteiner	America
1931	Otto Warburg	Germany
1932	Charles S. Sherrington	England
	E. D. Adrain	England
1933	Thos. H. Morgan	America

LITERATURE

1920	Knut Hamsun	Norway
1921	Anatole France	France
1922	J. Benavente	Spain
1923	W. B. Yeats	Ireland
1924	Wladislau Reymond	Poland
1925	G. B. Shaw	England
1926	Signora G. Deledda	Italy
1927	Henri Bergson	France
1928	Mrs. S. Undset	Norway
1929	Thomas Mann	Germany
1930	Sinclair Lewis	America
1931	Erik A. Karlfeldt	Sweden
1932	John Galsworthy	England
1933	Ivan Bunin	Russia

PEACE

1920	L. Bourgeois	France
1921	K. H. Branting	Sweden
	Chr. L. Lange	Norway
1922	F. Nansen	Norway
1923		No Award
1924		No Award
1925	C. G. Dawes	America
	A. Chamberlain	England
1926	Aristide Briand	France
	G. Stresemann	Germany
1927	Ludwig Quidde	Germany
	Ferd. Buisson	France
1928		No Award
1929	F. B. Kellogg	America
1930	N. Solderblom	Sweden
1931	Dr. N. M. Butler	America
	Jane Addams	America
1932		No Award
1933		No Award

Node, in botany, the distinct joint formed by stems from which the leaves and branches arise. The portions of the stem between the nodes are known as internodes.

Nogi (*nō-gē*), **Count Maresuke,** a Japanese soldier and samurai, born in Choshu in 1849. He served in the Satsuma Rebellion, and later was made Governor-General of Formosa. He received the rank of General on June 6, 1904. He commanded the third army in Manchuria in the Russo-Japanese war, rendering valuable service in the Battle of Mukden. General Nogi led the forces that captured Port Arthur in 1905. He bore the reputation of being a model soldier according to the most rigorous and ancient standards. This is considered the more remarkable, as Choshu men generally are credited not so much with courage as sagacity. In adherence to an ancient Japanese custom, General Nogi and his wife killed themselves by committing hara-kiri at their home on September 13, 1912, just as the body of their late emperor, Mutsuhito was being taken from Tokio for burial.

Nome (*nōm*), a city of Alaska on the Seward Peninsula directly west of Cape Nome and on the north shore of North Sound, is situated at the mouth of the Snake River and is 2,400 miles from Seattle. The discovery of gold was made on the beach along the coast line in 1889. Much richer deposits were discovered the following years at the mouth of the river. The richest known gold fields in Alaska lie within the Cape Nome district. There is much copper, tin, bismuth, and galena found in the ore. The gold dust is extracted by the dredging operation, a rather costly method, but it is estimated that there is sufficient sand in sight so that this industry will continue for another fifty years. The field, however, has been quite thoroughly worked and the process that is now used is too slow and expensive to attract the veritable hordes that rushed in search of gold at the turning of the Twentieth Century. At that time it was only a mining camp without a wooden building on the site, but by 1907 Nome had grown into a thriving little city with a water supply system, sewage, an electric lighting plant, a railroad, the telephone, the public school and a library. This prosperity flourished for only a short time, as is shown by the decline in its population. In 1900 there were 12,488 inhabitants in Nome. By 1910 the population had dropped to 2,600 and in the last government census of 1930, there were but 1,213 inhabitants in the city. At one time this little city was the commercial and educational center of Alaska with the northernmost terminus of the United States military telegraph located in Nome for many years. Juneau, the capital, is now the leading city of the Alaskan Territory.

The death knell of this bustling town of Nome was practically sounded on September 17, 1934, when a devastating fire swept through the entire area. Amid the ruins of ashes there stood but two business buildings, a hotel and a few residences in the north section of the city. At least the growth and development of the town has been severely retarded by this complete destruction. The building which housed the fire department was destroyed, a great handicap to the firemen and the townspeople in their effort to extinguish the conflagration. They resorted to the use of dynamite in hopes of checking the onrush of the flames, but this proved to be fruitless and the flames were but fanned into greater fury. Lomen Commercial Company and the United

States Radio Station were the only two buildings in Nome left standing.

It has been estimated that Nome has produced more than $35,000,000 in gold dust since its discovery, with as much as $8,000,000 of the precious metal produced the years when the mines were operating at their greatest capacity. The entire output of gold from all mines in Alaska in 1931 amounted to only 466,006 ounces, which was valued at $9,633,000, evidence of how the resources of this mineral are diminishing.

Nootka (*nōōt'kä*), a group of Indians forming one of the branches of the Wakashan linguistic stock of North America. They are situated on the western coast of Vancouver Island, in southern British Columbia, and in the Cape Flattery region of the State of Washington. The entire group is officially estimated to include eighteen tribes, each using a slightly different dialect. They are a sea-loving people, occupying the coasts, where they use large dugout canoes in fishing, and are daring sailors. Their life has a strong communal basis. The clan system is very complex, and the families occupy communal houses built of heavy timbers and cedar planks. The religious ceremonies are conducted in dramatic form. The actors in these sacred dramas wear wooden masks carved to represent the mythical founders of their religion, and dress in peculiar costumes. Even more characteristic of the Nootka is potlatch, a peculiar custom. The idea of wealth is that the possessor may constantly be giving away his property. The Nootka do this by means of a peculiar social form in which the receiver of a gift is obligated to return more than he has received. Young men of various tribes, starting out in life, will borrow property to bestow on others in order that they may profit by the "interest" and thus acquire household property. Potlatch is thus an investment system. For instance, among the Kwakiuth, the gift is returned with interest at one hundred per cent. When the unit of value is a blanket, the young man can borrow several blankets and distribute them to members of his tribe. They must give back three times the number of blankets they received. In turn, the young man pays his original debt with one hundred per cent interest, and have left as many as he borrowed. By reinvesting, he may increase his property rapidly. It is a strict principle of potlatch that no one can refuse a gift or escape the necessity to repay it with interest. The term, however, is usually applied to a public ceremony and feast in which individuals or tribes conduct a contest in displaying wealth or blankets, and much property is given away.

Nootka Sound, an important harbor, is situated on the western coast of Vancouver Island, in British Columbia. This harbor is ten miles in width, and affords very good anchorage. The entrance to the harbor is protected by Nootka Island. The region of Nootka Sound became known all over the world after the Spaniards drove out an English settlement in 1788. Two years later, however, the question was settled by arbitration.

Norbert (*nôr'bĕrt*), **Saint**, the founder of a religious order known as the Premonstratensians, was born in Xanten, near Cleves, in 1082. Norbert was an unusually pious man and led a most austere life. In founding his sect his rule was a return to the primitive zeal of monasticism. Norbert founded the severely ascetic order in 1120 at Prémontré in the diocese of Laon in France. The Premonstratensians were garbed in a white habit and soon the name "White Canons" was attached to Norbert's followers. Oftentimes they were referred to as the Norbertines. The order spread rapidly in France and Germany as well as in the Low Countries. In 1127 Norbert was chosen archbishop of Magdeburg. He died in 1134, and was canonized by Gregory XIII in 1582. A large Premonstratensian abbey still exists at Tongerloo, Belgium.

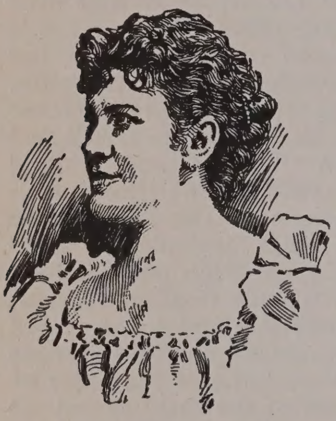
Nord (*nôr*), the most northerly department of France, is situated along the Belgian frontier and the Strait of Dover. It extends over an area of 2,228 square miles. The surface is flat in the northern and central districts, but becomes hilly and wooded toward the south. The Scheldt, Lys, and tributaries of the Meuse and Seine, water the land, which is fertile and cultivated extensively. There is great mineral wealth, the greatest coal-fields of France centering around Valenciennes. The fisheries are productive, and the chief agricultural products are flax, cereals, sugar-beets and potatoes. The chief industries include textiles, machinery, glass, tobacco, porcelain and sugar. Nord was almost wholly occupied by German troops during the World War, and was the scene of the most severe battles of the early period. It is one of the most densely populated departments of France. In 1931 the population of Nord was 2,029,449; of Lille, the capital, 201,568.

Nordau, (*nôr'dou*), **Max Simon**, a Hungarian physician and author, the most ardent of Zionists, was born at Budapest on July 29, 1849, of Jewish ancestry. He came into public notice by his work entitled *Degeneration*, published in 1895, in which he argued powerfully in defense of the proposition that the occidental nations are degenerating, morally, mentally and physically. He held that in politics, society and faith, the age is thoroughly decadent. The work evoked many replies, which kept it continually before the public. He had been writing for almost twenty years before, but only a few of his volumes had been translated into English. The best known of his works are *Paradoxes* and *The Malady of the Century*. After the publication of *Degeneration*, he issued *The Comedy of Sentiment; The Right to Love;* the *Drones Must Die*, and others of limited circulation. He died in 1923.

Nordenskjold, (*nô-rĕn-shŭl'*), **Nils, Adolf Erik,** an arctic explorer, was born at

Helsingfors, Finland, who became a Swedish citizen. He completed exploration of northeast passage from Atlantic to Pacific oceans.

Nord'hoff, Charles, an American authors was born at Erwitte, Prussia, Aug. 31, 1830. He came to the United States with his parents when a child of five years, and was educated at Cincinnati. He entered the United States navy in 1844, and during a service of three years made a voyage around the world. He became a journalist, first at Philadelphia and later at Indianapolis. From 1861 to 1871 he was editorial writer for the *New York Evening Post.* The next two years he spent in travel through California and the Hawaiian Islands. He then became Washington correspondent for the *New York Herald.* His principal works are *A Man-of-War Life, The Merchant Vessel, Whaling and Fishing, Stories of an Island World, Cape Cod and All Along Shore, California, Politics for Young Americans* and *The Communistic Societies of the United States.* Died 1901.


LILLIAN NORDICA

Nor'dica, Lillian, the stage name of Mrs. Zoltan F. Döme, an American prima donna, who was born at Farmington, Me., in 1859. Her musical education was pursued at the New England Conservatory, Boston, and her later studies at Milan, Italy. She made her début as an opera singer at Brescia, Italy, in *La Traviata.* In 1887 she appeared in London with marked success, following up her triumphs in Paris by others at St. Petersburg and various European capitals. Mme. Nordica sung leading parts in forty operas and in all the standard oratorios. She was married first to F. A. Gower; second (1896) to Herr Döme, whom she divorced in 1904. She died in 1914.

Nor'folk, Va., a city and port, stands on the right bank of the Elizabeth River, about eight miles from Hampton Roads. It is built irregularly on low ground, but has a large, deep harbor, defended by Fort Calhoun and Fortress Monroe. The city contains a city hall, mechanics' and masons' hall, custom house, military academy and seminary; it has an excellent system of public schools and owns eighteen buildings. Norfolk ships cotton, oysters and early fruits, is the largest peanut market in the world, and is the fourth cotton port of the U. S. It is served by eleven railroads, which find their deep-water terminus here. The place was burned by the British in 1776, and was the scene of the battle between the *Monitor* and *Merrimac.* Population 130,000.

Nor'mal Schools. From time to time throughout the history of education the need of special training for teachers has been emphasized. This training aimed, however, until comparatively modern times, at better mastery of subjects to be taught, and was not obtained in schools especially devoted to the science and art of teaching. The Jesuits were famous for the care with which their teachers were selected, for the thoroughness of their training in subject matter and for their system of apprenticeship in teaching. Mulcaster (1548-1611), an English schoolmaster, urged that the universities provide professional courses for teachers. In 1685 La Salle, the founder of the *Institute of the Brethren of the Christian Schools,* established at Rheims an institution for the training of elementary teachers, very likely the first of the kind. Special training of teachers was begun at Halle by the educational reformer, Francke, in 1697. His plans were further developed by his pupil, Hecter, and fostered by Frederick the Great of Prussia. The present normal school system of Prussia was established in 1819. Elementary teachers in Prussia are to-day nearly all graduates of these normal schools. In France the National Normal School was founded in 1795. Normal schools became general after 1832, and to-day about two thirds of the elementary teachers of France have graduated from them. In both Prussia and France students are supported while in attendance upon normal schools. After graduation they are required to teach. Both countries maintain two grades of schools for teachers. The lower one gives to graduates of the elementary schools a three years' course that prepares them for elementary teaching. Upon graduation they are appointed, at first on probation, when, if successful, they receive permanent certificates. In Germany most of the secondary teachers are trained in the teachers' seminaries, which are connected with gymnasiums or universities and as a rule give a course of one year's teaching and one year of practice. France possesses two higher normal schools, giving courses of two and three years respectively, which prepare teachers for the primary normal and the superior normal schools. The normal schools in Great Britain sprang out of an effort to improve the teaching done in the schools of the great charitable public school societies. In 1839 money was granted by the government to be used by them in establishing training colleges. From these are derived a large part of the teachers in the public elementary schools of England to-day. They still remain, as originally, under denominational control. In the United States the first public normal school was established at Lexington, Massachusetts, in 1839. It was the result of agitation in behalf of better training for teachers begun by James G. Carter in 1820 and continued by Charles Brooks and especially by Horace Mann. To-day every state but Delaware contains one or more normal schools.

Some normal schools admit those having an elementary education, giving them a four-years course. The majority, however, admit only those who have completed a high school course or its equivalent. The greater number of normal schools admitting only high school graduates offer a two-year course of professional training in teaching, and the graduates therefrom may teach in the grades and secondary high schools. There is a growing tendency, however, for normal schools to offer the high school graduates a four-year course, giving them a regular college degree. The students, of course, have majored in educational subjects. Graduates of this course may teach in first class high schools. With the increasing demand for skilled teachers, and with advancing salary schedules, the gradual trend is toward a four-year post-high school course even for the elementary teachers, whose salary schedules may sometime be equal to the teachers in the high schools. The tendency is toward requiring more professional studies. At first it was for the sake of securing better informed rather than better trained teachers, and this may be said of the normal schools in Europe as well as of those in the United States. Eventually, as the general system of schools is rendered more efficient, it becomes possible to hand over to this the responsibility for such general information as the teacher needs, reserving for the normal school such study as is specially aimed toward fitting for teaching. It is to be noted that practice teaching under a critic teacher is probably the most valuable part of such work, and most normal schools in the United States as well as in Europe control elementary schools in which this teaching is done. In this respect the normal schools possess an advantage over the departments of education that have come to exist quite generally in the American colleges and universities, very few of which have any facilities for practice teaching. It is true that college graduates who teach go especially into secondary and higher schools, needing in consequence much more knowledge of subject matter than is required of elementary teachers. But although familiarity with his subject is the prime essential for any teacher, knowledge of how to teach is scarcely less important. and this holds of the teacher in high schools and colleges as well as of those in the primary schools. The failure to realize this is doubtless the cause of the increase of bad teaching as we go from the primary school to the university. The lack of opportunities for professional training for secondary and college teachers has caused some normal schools intended originally for the training of elementary teachers to undertake the preparation of secondary ones as well. It is probable that such work can not be done in teachers' colleges connected with universities or in universities the departments of education of which possess practice schools. The committee on normal schools of the National Educational Association recommends the following program for a four years' course: arithmetic, elementary algebra, plane geometry, English grammar, English, elements of rhetoric, zoology, botany, physiography, physics, chemistry, nature-study, penmanship, drawing, manual training (either domestic science or sloyd or both), reading, music, fine arts, sociology, history, civics, economics, folk-lore, general physical education, gymnastics, games, school sanitation, psychology, pedagogy, observation and teaching in the training-school. The last four should be taken for a year each, and together they should amount to one fourth of the entire course. Many of the other subjects would disappear in case the school admits only high-school graduates. Compare *Modern Education*, *Elementary Schools* and *Secondary Schools.*

Nor'man, Henry, an English journalist, was born at Leicester, England, Sept. 19, 1858. He studied, however, in this country, graduating from Harvard College in 1881 and passing the next two years at Leipsic, Germany. He then accepted a position on the *Pall Mall Gazette*, London, and later became associate-editor of the *Daily Chronicle.* He has published works upon *China*, *Corea*, *Japan*, *Siberia* and *The Balkans.* He has in recent years published *The Real Japan*, *The Peoples and Politics of the Far East*, *The Near East*, *All the Russias* and *Motors and Men.*

Nor'mandy, an ancient province of France bordering on the English Channel, comprises at present an area of about 10,500 square miles, divided into the departments of the *Seine-inférieure*, *Eure*, *Orne*, *Calvados* and *Manche.* The soil is fertile and the population about 2,500,000. The present inhabitants are lineally descended from the ancient Normans, whose duke, William the Conqueror, in 1066 invaded England and established his dynasty upon the throne of that country. England and Normandy were thus under the same rulers until 1204, when Philip Augustus conquered Normandy and made it a part of France. It was reconquered by the English in 1415 at Agincourt, but again wrested from them by Charles VII in 1449. The people are hardy, industrious and exceedingly proud of their history. Their language and their art have left abiding evidences of their value upon the literature and architecture of France. The chief city of the region is Rouen (population 124,987).

Nor'mans. See NORTHMEN.

Norns. The fates of Scandinavian or Norse mythology were three maids named Urd, Verdandi and Skuld, meaning past, present and future. They were supposed to sit by the well of Urd, under the world tree in Asgard, and determine the fate of gods and men. There also were lesser norns, all working on the destinies of man.

Norristown, a borough and the seat of Montgomery County, Pennsylvania, is situated on the left bank of the Schuylkill seventeen miles northwest of Philadelphia. Among its notable buildings are the Court House of marble structure, and the State Asylum for the Insane. Its manufactures include cigars, tacks, glass, wire, screws and boilers. There are also cotton and woolen mills, rolling mills, flour mills and foundries. The population in 1930 was 35,853.

North Adams, a manufacturing town of Berkshire County, Massachusetts, is situated on the Hoosac River, where the north and south branches unite near the west end of Hoosac Tunnel, 143 miles from Boston. It has large cotton and woolen mills, shoe and print factories, machine shops, leather manufactories and foundries. Among its important institutions are a State Normal School, public and parish schools, high schools and the North Adams Library. The population in 1930 was 21,621.

North America. See AMERICA.

North Bay, an important railway town and the capital of Nipissing District, Ontario, Canada, is situated on Lake Nipissing, 360 miles from Montreal. It is a divisional point of the Canadian Pacific Railway and the junction of Temiskaming Railway and the northern division of the Grand Trunk. A smelter for the reduction of ores is located at Trout Lake, three miles distant, and the chief industries of North Bay center in the iron ores of the district. The population in 1931 was 15,528.

North Cape, usually called the extreme northerly point of Europe, is not on the Continent, but is a promontory on the island of Mageroe. The actual continental extremity is Cape Nordkyn, six miles south and forty-five miles east of North Cape.

North Carolina (*kă-rō-lī′nȧ*) is one of the South Atlantic States and one of the original thirteen states of the Union. It is bounded on the north by Virginia and Tennessee; on the east by the Atlantic Ocean; on the south by South Carolina and Georgia, and on the west by Tennessee. North Carolina extends over an area of 52,426 square miles, 3,686 square miles of which are water.

Surface. The surface of the State falls into three natural divisions, a wide coastal plain, a foothill or Piedmont region and the Appalachian Highland, these divisions distinctly marked from the northeast to the southwest. The Coastal Plain rises gradually from the sand bars along the coast forming a long low plain extending fifty miles inland and called the Flatwoods. Many lagoons, shallow lakes and rivers traverse this plain and along the sea coast the region is bordered by countless inlets and bays. The Piedmont region is a broad plateau of about 300 miles, becoming gradually more rolling and rising to an elevation of 1,200 feet. The Appalachian Highlands bordered on the east by the Blue Ridge, the Black and Great Smoky Mountains have the Black, Cowee, Nautahala and South Mountains traversing them. Many high peaks soar in these ranges to a greater altitude than any found in the mountains of New Hampshire. Mount Mitchell, 6,711 feet high, in the Black Mountains is the loftiest peak east of the Mississippi River and is popularly known as Black Dome. The Chowan, Roanoke, Tar, Neuse and Cape Fear are the principal rivers flowing to the ocean through the Piedmont Plateau and the Coastal Plain. On the western slope of the mountains the Little Tennessee, Big Pigeon, and French Broad Rivers flow into Tennessee; the Yadkin and Catawba Rivers flow into South Carolina, and the Dan and Staunton Rivers in Virginia, unite in the Roanoke. Albemarle and the Pamlico are the two important sounds of broad shallow bodies of salt water that cut deeply into the coast line. A long reef of sand borders these sounds with Cape Hatteras the easternmost point, which has many treacherous shoals and is feared by mariners as a very dangerous sea area.

Climate. The climate of the State varies according to the altitude, from semi-tropical along the coast, milder on the tableland and comparatively cool in the mountains. The mean annual temperature in the southeastern section of the State is sixty-four degrees Fahrenheit, while in the southwest, at an elevation of 3,800 feet, the mean annual temperature is fifty degrees. The average rainfall for the year is approximately fifty-two inches, ranging to fifty-four inches along the Coastal Plain; forty-eight inches in the Piedmont Region and fifty-three inches in the mountains. On the eastern slope of the mountains the rainfall is very heavy with more than 106 inches recorded for a year.

Minerals. The soil of the Coastal Plain is silty and sandy loams and a very fine sand, while to the west a yellow and grand sandy soil is found. In the mountains a clay which abounds with feldspar and aluminum properties is found mixed with the sand. The clay, which is especially valuable in making brick tile and pottery, is found in great quantities in the State. The mountainous regions contain many minerals but the quantities are so small of some that it is not profitable to mine them. The State ranks first in the production of mica, and magnetic iron ore is found in large deposits. Some lead, silver, gold, copper, zinc, corundum, tin, feldspar, talc, coal, graphite, barytes, gems and mineral waters are produced. Granite, sandstone, millstone and limestone are quarried in North Carolina. Zucon and monazite properties, used in manufacturing incandescent light mantles, are found in the State and help supply these minerals. Opals, rubies, agates, emeralds, garnets, amethysts, and some diamonds are among the precious stones found in the ores. The mineral production of North Carolina for 1930 was valued at $7,462,450.

Production and Industry. Agriculture is an important industry of North Carolina. More than sixty-four per cent of its total area is devoted to farm land. The plantation system, found almost universally throughout the State, in the first half of the nineteenth century, has practically disappeared. The average farm in 1850 consisted of 368 acres, and in 1920 the average farm covered seventy-four acres. Many tenants, however, operate the farms to-day and the owner maintains supervision so that the principle of plantation farming is still practised. In 1930 there were 279,704 farms with a farm population of 1,597,220 inhabitants. The total area of the farms covered 18,122,401 acres, and the property, including buildings, equipment and farms, was valued at $850,342,794 in 1930.

Corn and wheat are the largest crops, but cotton is of more value to the State. Three-fourths of the total grain crop consists in corn with 34,830,000 bushels grown in 1932. There were 5,572,000 bushels of wheat produced in the same year and 640,000 bales of cotton. Over 1,384,000 acres of land in the eastern and south central district of the State were under cotton cultivation in 1932. North Carolina usually ranks first among the states in the Union in the production of tobacco. In 1932 the yield totalled $280,840,000 pounds. Peanuts are grown on the Coastal Plain. In 1932 there were 276,360,000 pounds produced. Sweet potatoes are also an important crop of which 7,990,000 bushels were produced in 1932. Other crops of the State are rice, hay and forage, nuts and fruits, seeds, other than the grains, market vegetables and wild huckleberries. Livestock forms an important phase of farming as is shown in the number of farm animals in the State during the year 1931. On January 1, 1932, there were 77,000 horses; 547,000 cattle; 273,000 mules; 91,000 sheep, and 880,000 hogs on the farms throughout the State. The income from livestock in 1931 amounted to $60,818,000, and the income from farms the same year amounted to $119,488,000.

The Coastal Plain still has extensive forests of yellow pine which yield great quantities of resin, pitch, tar and turpentine. It is from these two latter products that North Carolina derives two of its nicknames "Turpentine" and "Tarheel State." At one time there were 11,000,000 acres covered with virgin forests. To-day there are only 5,000,000 acres remaining, and 1,250,000 acres lying idle. In the southeastern corner of the State there are large swamps of cypress, while along the coast line, oak, chestnut, magnolia and palmetto are found. In the Piedmont Region, hickory, maple, oak, walnut, ash, elm and basswood abound in the forests, lumber which is especially useful in the construction of furniture and vehicles. In the mountains are found the connifers, such as fir, hemlock, cedar, spruce and white pine. There were 451,160 acres of national forest lands in North Carolina in June, 1932.

North Carolina fisheries form an important commercial industry of the State. A wide variety of fish are caught annually. This catch includes shad, oysters, herring, mullet, alewives, clams, bass, menhaden, perch, blue fish, and black terrapin. Federal and State agencies have established hatcheries and have been of value protecting the resources. The government hatchery for shad and herring is situated at Edenton, for rock bass and salmon at Weldon. Large oysters of excellent quality are taken from New River. While the rivers of North Carolina are non-navigable because of their fall at the old shore line of the ocean, they have been turned into streams yielding vast power through the same agency. The State has water-power unsurpassed and scarcely equalled in any other section of the country. On January 1, 1933, the developed water power amounted to 970,860 horse power with 1,960,000 potential power awaiting development. This power is used to a great extent in the operation of the State's 3,792 industrial plants, which produced goods valued at $1,312,000,000 in 1929. North Carolina leads the Union in the manufacture of cotton goods, cotton yarn, hosiery, furniture, cigarettes, and smoking and chewing tobacco. These industries are the source of great wealth to the State. The textile industry was valued at $450,000,000 in 1929. The State ranks first in the number of cotton mills and in the consumption of cotton in the United States. In July, 1932, there were 5,636,000 cotton spindles in operation consuming 1,183,300,000 bales of cotton. Among other important industries are flour and grist milling, tanning and curing of leather, extracting cotton seed oil and cake, and the making of machinery, utensils and fertilizers. The principal industrial cities in North Carolina are Winston-Salem, Durham, Charlotte, Greensboro, Gastonia, Highpoint, Newbern, Asheville, Raleigh, Wilmington and Thompsonville.

Transportation. In 1932 there were 4,959 miles of steam railways and 157 miles of electric roads in the State. The chief railway systems are the Southern Seaboard Air Line; the Norfolk and Southern, and the Atlantic Coast Line. Wilmington, the principal seaport and commercial center of North Carolina has direct water and rail connections with the larger cities to the north, with New York, Baltimore and Philadelphia. Dismal Swamp Canal connects Albemarle Sound and Chesapeake Bay, and the Neuse, Roanoke and Cape Fear River are navigable several miles inland which aid materially in providing transportation facilities. The State maintains 9,752 miles of highways, 8,400 miles of which are hard surfaced, which make the many beauty spots of the State easily accessible. Asheville is a popular resort every season of the year. It is situated in the very heart of exquisite scenery between the Blue Ridge and Cumberland Mountains. Deep gorges, waterfalls and beautiful clear lakes abound in this region. One small section alone has over fifty cascades, cataracts and a waterfall with a drop of 370 feet.

Population. North Carolina, with a population of 3,170,276 inhabitants in 1930, shows an increase of nearly twenty-four per cent over the 1920 census report. Only three per cent of the total population is comprised of foreign born whites. Negroes numbered 918,647 and comprised twenty-nine per cent of the population in 1930. Notwithstanding the industrial growth of the State, the population is only one-fourth urban. None of the cities are unusually large but are important for their diversified commercial development. The principal cities, with their populations in 1930, are Charlotte, 82,675; Winston-Salem, 75,274; Durham, 52,037; Asheville, 50,193; Raleigh, the capital, 37,379; Greensboro, 53,569; High Point, 36,745, and Wilmington, 32,270. Indian Reservations extend over an area of ninety-nine square miles where 16,579 Indians dwell.

Education. A public school fund was provided for in North Carolina in 1825. In 1840 the public school system was established. State appropriations for education are aided by local taxation in the larger towns. There is an equal distribution of educational funds between the races. Separate schools are maintained for the white, negro and Indian children. Compulsory education is enforced for those children between the ages of seven and thirteen years. There were 4,372 elementary schools in the school year 1931-32, with an enrollment of 746,450 pupils and 18,387 teachers. There were 826 high schools with an enrollment of 134,875 pupils and 4,793 teachers. In 1930 the illiteracy rate in North Carolina was ten per cent of the population, having been reduced from thirteen per cent in 1920 and 18.5 per cent in 1910. This illiteracy percentage included twenty per cent of Negroes and five per cent of native whites. The State makes annual provision for its normal institutions, maintaining three for white, three for negro and one for Indian teachers. Ample opportunities for higher education is provided for in seven State institutions and thirty-nine private and denominational colleges. Besides the University of Chapel Hill, the other important schools and colleges are North Carolina College of Agriculture and Mechanic Arts at West Raleigh; Trinity College at Durham; Davidson College at Davidson; the State College for Women at Greensboro; Guilford College at Guilford; Wake Forest College at Wake Forest, and Meredith College at Raleigh. Institutions of higher learning for Negroes include the Agricultural Technical College at Greensboro; Shaw University at Raleigh; Livingstone College at Salisbury, and Biddle University at Charlotte.

The University of North Carolina was chartered in 1789 and opened in 1795. It is one of the oldest State universities in the United States. Chapel Hill, the seat of the university, is situated twenty-eight miles northwest of Raleigh. During the Civil War and the ensuing period, the University was depleted of funds and for several years during the reconstruction period it was closed. It reopened in 1875 and since 1881 the University has been maintained almost entirely by the State. It is governed by a board of trustees elected by the State Legislature. The campus occupies forty-eight acres with a natural forest of 500 acres adjoining it. The University comprises colleges of liberal arts, applied science, pharmacy, medicine, law, commerce, public welfare, engineering, mining, and a graduate school. Summer sessions are held each year.

Government. The present Constitution under which North Carolina is governed was adopted in 1876. It is the fourth constitution of North Carolina and has been amended several times to meet the demands of the State. State elections are under the supervision of a State board of electors who are appointed by the Governor. The General Assembly is composed of a Senate with fifty members and a House of Representatives with 120 members, all of whom are elected for two-year terms, serving simultaneously.

The executive department of State is comprised of the Governor, Lieutenant-Governor, Secretary of State, Attorney-General, Treasurer, Auditor, and Superintendent of Public Instruction, all elected for four-year terms. In 1925, North Carolina adopted the Budget Plan, whereby the Governor became the financial head of the State. The Local Government Commission, a newly created central bureau of control, was created by an act of the State Legislature on March 3, 1931, which brought the entire financial administration, including the collecting, expending and accounting of the State funds, under one responsible head.

North Carolina is represented in the National Congress by two Senators and eleven Representatives.

History. Sir Walter Raleigh made three attempts to establish settlements in the Carolinas, at that time known as Virginia. The first such attempt was made in 1584 when this region was visited by two vessels commanded by Arthur Barlow and Philip Amadas, who returned to England with glowing accounts of the beauty of the new land. The second expedition was made in 1585 when seven vessels under the command of Sir Richard Grenville landed at Wacoken, then on to Roanoke Island and leaving a small group of settlers. This group suffered severely at the hands of the Indians, as well as from the lack of food and poor housing facilities and returned to England the next year with Sir Francis Drake. In 1587 the third expedition left England under the command of John White, and another settlement was established at Roanoke. It was here that the first white child of English parentage, Virginia Dare, was born.

King Charles I of England granted a patent on October 30, 1629, to his Attorney-General, Sir Robert Heath. This included all the territory between the thirty-first and thirty-sixth parallels of the north latitude from the Atlantic Ocean to the South Seas, and in this grant he decreed the region to be named

Carolana or Province of Carolana from the Latin version "Carolus" of his own name. A new patent, dated March 24, 1662, and under the name of Carolina, was granted by King Charles II of England to the Earl of Clarendon, the Duke of Albemarle, Lord Craven, Lord Berkeley, Lord Ashley, Sir George Carteret, Sir William Berkeley and Sir John Colleton. These eight proprietors divided this territory into North and South Carolina and sent out settlers. The first permanent settlement was established by a group of Virginia dissenters at Albemarle. The settlements within the colony suffered so severely from the attacks of the Indians that the proprietors sold their shares to the Crown in 1728 with the exception of Carteret, and a Royal Governor was sent to each of the Carolinas. From 1729 until 1775, North Carolina remained a royal province and grew rapidly.

North Carolina followed Virginia into the French and Indian War, and opposed the Mother Country in the Stamp Act and importation of tea. On May 20, 1775, the colony declared its independence in the famous Mecklenberg Declaration of Independence, which was passed in convention at Charlotte in Mecklenberg County. Two battles of American Revolutionary War fame were fought at Kings Mountain and Guilford Court House in North Carolina. It was the twelfth State to ratify the Constitution and the last of the eleven states to secede from the Union in 1861. It earnestly supported the Confederacy, furnishing soldiers to the Confederate army in excess of the voting population of the State, and the largest number that was furnished by any of the Southern States.

During the period of Reconstruction, North Carolina was placed under a military government and it was not until 1868, when the State ratified the fifteenth amendment, that this ban was lifted.

Northcote, Baron Henry Stafford, formerly Governor-General and Commander-in-Chief of the Commonwealth of Australia, the younger son of Sir Stafford Northcote, was born in 1846. He entered the diplomatic service at an early age, as private secretary to Lord Salisbury on his mission to Constantinople. Later he became financial secretary to the English war office, and served a term as Governor of Bombay. In 1903 he succeeded Baron Tennyson in the Australian governorship. His character and statesmanlike views won for him a high place in the service of his country.

North Dakota, a North Central State of the Union, originally part of the Louisiana Purchase and admitted in 1889. It is bounded on the north by Manitoba and Saskatchewan; on the south by South Dakota; on the east by the Red River of the North, which in part separates it from Minnesota, and by Minnesota; and on the west by Montana. It extends over an area of 70,795 square miles, its length being 210 and its breadth 360 miles. Its chief river is the Missouri, which courses from the northwestern extremity of the State to its border in the center, and is fed by a number of streams, chiefly falling into it from the west. The capital is at Bismarck.

Surface and Climate. North Dakota in considerable part, has a fertile belt of producing land, especially in the northeast of the Red River tract, where the soil is a rich, black loam, with a deep alluvial deposit, once covered by ancient Lake Agassiz. In the north central part are Turtle Mountains, which extend southward from Manitoba over a considerable area of the State; portions of this region are covered with timber, while southeast of the mountains is Devils Lake, whose area of salt water, without outlet, is about forty miles in length and from six to eight in average breadth. Elsewhere the characteristics are those of the treeless prairie with various grasses and forage plants, and underlying this in the northwestern region are tracts of lignite, clay, lime, salt, building-stone and occasional traces of iron. The climate is a dry and bracing one, with temperature varying between twenty to forty degrees below zero in the winter months and 110 to 114 degrees in summer. For the most part the rainfall is sufficient for farming, although scanty in the west and northeast. The growing season is too short for a large corn crop, and although the annual production is around 3,000,000 bushels, wheat is by far the most important crop, representing, both in acreage and value, nearly two-thirds of the State's total cereal production. The great bulk of the wheat raised is of the spring variety owing to the severity of the winters; but some winter wheat is raised, and quite a little of what is known as Durum, used in the manufacture of macaroni. The raising of flaxseed ranks next to wheat in importance, the annual production being over half that of the entire country. Other important crops are hay, potatoes, rye and barley. The climate is not suitable for the larger fruits, but the hardy small fruits, such as currants, blackberries and strawberries, do well. Livestock interests are important, and, owing to the light snowfalls which are soon swept away by the prairie winds, cattle feed in the plains the greater part of the year.

Manufactures. The industries are chiefly centered in flour and grist mill products, with the kindred industries of butter, cheese and condensed milk. The value of the products of the flour and grist mills is over sixty per cent of the total factory output of the State. Next in importance is the printing and publishing business.

Transportation. There are over 4,000 miles of railroad in the State, belonging to the Northern Pacific, the Great Northern and the Minneapolis, St. Paul & Sault Ste. Marie. Fargo is on the main line of the Northern Pacific from St. Paul to Portland. North of this is the main line of the Northern Pacific, which runs from St. Paul to Seattle. The Minneapolis, St. Paul & Sault Ste. Marie extends from Fairmount to Portal, North Dakota.

Finance. A general property tax is the chief source of the state's revenues, supplemented by an income from other sources, including license fees from express and sleeping car companies and a tax on the premiums of insurance companies. Exclusive of the interest on the state's bonded indebtedness, the rate of taxation is limited by the Constitution to 4 mills on the dollar.

Education. The schools are supported on the proceeds of the sale of public lands, supplemented from other sources, including local taxation and all fines for violation of state laws, proceeds being apportioned according to population. The minimum school year is fixed at six months. Attendance for at least twelve weeks, six of which must be consecutive, is compulsory for children between the ages 8 and 14. There are a state agricultural college at Fargo and normal schools at Mayville and Valley City. Higher education is represented by the University of North Dakota, near Grand Forks, with 51 instructors and 807 students; Fargo College (Congregational), with 19 instructors and 244 students; and by Red River Valley University (Methodist Episcopal), at Wahpeton.

History. The Dakotas were in the Louisiana purchase of 1803, and from that era to 1812 formed a part of Louisiana Territory, subsequently renamed Missouri Territory In 1810 French Canadians from the Canadian Red River settlement built a fort at Pembina, which Lord Leekirk, the Canadian governor, claimed mistakenly as a British stronghold. Early in the century the region was explored from Mandan by the Lewis and Clark expedition, and in 1839 a considerable part of the country was explored by Frémont. In 1849 North Dakota east of the Missouri became part of Minnesota for a time, and the area west of the river was made a part of Nebraska Territory In 1851 to the Federal government was ceded part of the lands held by the Sioux Indians, and these lands were thrown open for settlement. In 1861 Dakota Territory was created, part of Montana and part of Wyoming being included in it; while two years later, on the creation of Idaho Territory, the Dakotas assumed almost their present area, and in 1889 they were separated, forming North Dakota and South Dakota. After their erection into separate statehood, each was given a constitution, a convention which met at Bismarck in 1889 agreed upon a constitution, and in November the state was formally admitted into the Union.

North Dakota, University of, was established in 1883. The federal government gave it land which probably will eventually yield $2,000,000 as endowment. The state makes annual appropriations for it. It has an annual income of $360,000, including all receipts from benefactions and productive funds. The faculty numbers 91, the students 995 and the library 30,000 volumes. The departments comprise the colleges of liberal arts, of mechanical and electrical engineering and of mining engineering, the normal college and the schools of commerce and pharmacy

North, Frederick, eighth Lord North and second earl of Guilford, an English statesman, was born on April 13, 1732, and educated at Oxford. He entered the house of commons at the age of 22, and was made lord of the treasury in 1759. In 1767 he was appointed chancellor of the exchequer and leader of the house of commons, being there opposed to Fox and Burke. In 1770 he became prime minister, and his course, to a large extent, caused England to lose America. He resigned in 1782, and became blind five years before his death, Aug. 5, 1792.

Northampton, Mass., the county-seat of Hampshire County, is situated near the left bank of the Connecticut River, 103 miles from Boston. It manufactures paper, silk, cotton and woolen goods, sewing machines, baskets, cutlery, brushes and jet ornaments. In the city are the state insane asylum, Clark institute for deaf-mutes, public library and Smith College for women. Population 25,000.

Northcliffe, Alfred C. W. Harmsworth, Viscount, born 1865, died 1922, was said to be the owner of more daily and weekly newspapers than any other man in the world. Certainly for more than a decade he was the most powerful newspaper owner in England. His journalism was of the sensational type, catering to the popular taste rather than forming it. At the outbreak of the World War he vigorously advocated conscription and intimate alliance with France. He was a bitter critic of the Asquith government, and was largely responsible for the advent of Lloyd George as premier. Beginning his career as a free-lance journalist, without friends or influence, he first won success as owner of a cheap weekly called "Answers;" later he acquired the London "Evening News" and the "Daily Mail," and finally in 1908 the London "Times."

North'men or **Norsemen,** was a name applied in the middle ages to the seafarers who came from Denmark, Norway and Sweden, and then to those of Norway only. In plain words, they were pirates, who, during the summer months, visited other lands and preyed upon them. Their age may be divided into two periods, the first lasting to the middle of the 9th century, devoted to murder and plunder, and from then to the 13th century, given to permanent conquest in Ireland, South Italy, England and France. The first attack was made upon Wessex, in England, in 787, and reached France about the end of the century, and up to 850 they committed most terrible depredations. In 859 and 860 a large fleet entered the Mediterranean and ravaged Spain, Mauretania and Majorca, spending the winter at the mouth of the Rhone, to begin the attack on Italy in the spring. Thus they subsisted on the entire seaboard of Europe until Charles the Simple concluded a peace, by which they were allowed to settle in France, and gave them the territory between the Channel, the Seine and the Ept, on the condition that they fought for him and became Christians. The name of Normandy was given to this district, and the Northmen living in it were called Normans. They ruled here from the 10th to the 13th century, when it was taken from them by the king of France, the most illustrious of their dukes being William who became king of England in 1066, with the title of William the Conqueror. The Normans adopted the language and manners of the French, and changed their heathen rites for the Christian religion. The Norsemen, early in the 9th century, had opened the route to the White Sea by rounding North Cape, and before 1222 had many times sailed up the northern Dwina.

Nor'throp, Cyrus, an American educator from 1884 to 1911 president, now president emeritus, of the University of Minnesota, was born in 1834 at Ridgefield, Conn. He passed through Yale College and Yale Law School, and was admitted to the bar. During 1862-3 he was chief editor of the *New Haven Daily Palladium.* When elected president of the University of Minnesota he was professor of English literature and rhetoric at Yale, a position he filled with distinction.

North Sea or **German Ocean** is the southern arm of the Arctic Ocean, lying between Britain and Norway. It communicates with the Atlantic through the English Channel and Straits of Dover on the south, and by Pentland Firth and the Orkney and Shetland Channels on the north, and with the Baltic through Skager-Rack and Cattegat. It is over 600 miles long and 400 miles wide, and has an area of 180,000 square miles. The sea is in most places quite shallow, averaging 61 fathoms, but on the Norwegian coast is 360 fathoms deep. It is the receptacle of the waters of the Thames, Ouse, Humber, Tyne, Tweed, Forth, Tay, Scheldt, Rhine, Weser and Elbe. The water is probably the least salty of any of the large seas, and, except in the summer, is warmer than the surrounding atmosphere. The tides are irregular, having a large ebb and flow in some places, while it is hardly perceptible in others. The North Sea has long been one of the commercial highways of the world, and affords a valuable fishing-ground.

North Star, The, is the nearest conspicuous star to the north pole. All stars describe circles, those nearest to the celestial equator the largest circles and those farthest from the celestial equator or nearest to the poles the smallest circles. The North Star being nearest to the north pole describes only a very small circle, and consequently to people living north of the 40° north latitude it never sets. Polaris, the star Alpha of the constellation Ursa Minor, is at present the North Star, and many centuries must pass before the north pole will be defined by any other star Two stars in the constellation Ursa Major, commonly called the Big Dipper, always point in the direction of the North Star and enable it to be readily found. These stars are commonly called the pointers. They form the side of the bowl of the dipper opposite the handle.

North Ton'awan'da, N. Y., a city in Niagara County at the confluence of Niagara River and Tonawanda Creek; on the Erie Canal and the Lehigh Valley, Erie and New York Central railroads. Only 10 miles from Buffalo, several other railroads using leased tracks, and electric lines connect it with that city, Niagara Falls and other places. It has large manufacturing and commercial interests. Pig-iron, steam-pipes, merry-go-rounds, steam-pumps, bolts, nuts and a large variety of lumber products are manufactured here. The government is vested in a mayor, who holds office for two years, and a council consisting of two members from each ward and three at large. The city owns and operates its own water-works. Aided by the development of power at Niagara Falls, it has had a very rapid growth. Population 17,000.

Northwest Territories of Canada, The. Since the creation in September, 1905, of the new provinces in the west of the Canadian Dominion — Saskatchewan and Alberta — together with the creation (June, 1898), of Yukon Territory, the Northwest Territories have been considerably reduced in area. As at present constituted, their area now is only 1,922,735 square miles, 51,680 square miles being water surface. The territories are governed directly from Ottawa, instead of having a legislature and governor at Regina, as formerly, with representation in the Dominion Parliament. In early years the region of the Northwest Territories, including Manitoba and the new provinces west of it, was under the direct control of the Hudson Bay Company, by whom it was treated as a vast hunting preserve. Since the creation of the new western provinces and the erection of the separate Territory of Yukon, situated north of British Columbia and adjoining Alaska, the Northwest Territories embrace Mackenzie District (*q.v.*), through which Mackenzie River flows into the Arctic Ocean; Franklin District, comprising all the area around the Arctic seas; and Keewatin District, lying north of Manitoba, east of it as far as Hudson Bay and James Bay and south as far as the line of Albany River, the northwestern boundary of Ontario. The northwest Territories also embrace those portions of the original territories of Saskatchewan and Alberta not included in them as provinces, in addition to the northeast District of Ungava situated north of Quebec and extending from Hamilton and East Main Rivers north to Hudson Strait and flanked by the

Atlantic and by Hudson and James Bays on the west.

North'west'ern University was founded under Methodist Episcopal auspices in 1851. The professional schools maintain a policy of constant readjustment to the demands of growing knowledge and changing conditions. The university comprises the following departments: The college of liberal arts, the college of engineering, the school of music, and the school of oratory, at Evanston, Illinois, 12 miles north of Chicago; the medical school, the law school, the school of pharmacy, the dental school, and the school of commerce, in Chicago. Garrett Biblical Institute at Evanston, though under separate management, by close affiliation serves as the theological school of the university. The university has a permanent productive endowment of $5,137,000. The college library and the Elbert H. Gary Library of Law together contain 147,760 volumes and 76,550 pamphlets. The faculty numbers 480, and the students 5,400.

Nor'ton, Charles Eliot, an American author and educator, was born at Cambridge, Mass., Nov. 16, 1827. Young Norton graduated at Harvard College in 1846, and traveled in Europe and the far east for the following two or three years. He spent nine years abroad between 1849 and 1873. In 1864–68, he was joint editor with Lowell of the *North American Review*. In 1874 he was appointed professor of the history of art at Harvard, and in 1879 he became president of the Archæological institute of America, holding that office for 11 years. He received the honorary degree of Lit. D. from Cambridge, England, and LL.D. from Harvard. He published and edited about 20 volumes. His writings largely dealt with art and sociology, as in his *Recent Social Theories* and *Historical Studies of Church Building in the Middle Ages*. He wrote lives or edited works of *Dante*, *Michael Angelo*, *Carlyle*, *Emerson Lowell*, etc. He died, Oct. 20, 1908.

Nor'walk, Ct., a town in Fairfield County, at the mouth of Norwalk River on Long Island Sound, 41 miles from New York. The city has a state armory, Fairfield County Hospital and Norwalk Hospital. Public and parish schools and a Carnegie Library are the principal educational institutions. It has the largest straw hat factory in the United States and large manufactories of felt hats and goods, woolens, shirts, shoes, silks, corsets, locks, door knobs, besides foundries and iron works. It has a good harbor and large oyster fisheries. Population of Norwalk, 6,954; of South Norwalk, 8,968—total, including Norwalk town, 31,000.

Nor'way, the western and northernmost part of the Scandinavian peninsula, before November of 1905 united to Sweden only through having a common ruler; it is divided from Sweden by Keel Mountains, which run parallel to the coast from the north to 63° and then separate, the main division continuing to mark the boundary by a plateau from 2,000 to 4,000 feet wide. The higher peaks are Galdhopiggen, Glittertind, 8,379 feet; Snæhaetten, 7,566; and Lodalskaupen, 6,790. Bear, lynx and deer abound in these mountains, and the only inhabitants are the men and women who tend the large herds of cattle and sheep. On account of the Gulf Stream the winter on the coast is much warmer than in the interior, whereas the summer is much cooler. The largest cities are (Oslo) the capital (population 270,626); Bergen, Trondhjem, Stavanger, Drammen, Kristiansand and Fredrikstad. The hardiest grains and vegetables flourish, but the occupation of the people is mainly connected with the great fisheries. The mineral wealth has been practically exhausted since 1870, only a few mines being worked. Norway is divided into 20 districts, has an area of 124,130 square miles, and a population of over 3,000,000. It nominally is a limited monarchy, but actually, to all intents and purposes, almost is a free republic. The head of the government is a king, Haakon VII (*q. v.*), but his acts are limited by an appointed executive council of nine and one minister of state. The religion is Lutheranism, which still is the state-church of Norway. Non-Lutherans number only 53,000. One of the first peoples to settle Europe, their history does not, however, become free from myth until the 9th century, when the Lapps and Finns were found in the country by the Gothic descendants who then crossed the Baltic and settled there. For a long time it was a part of the kingdom of Denmark. Her history is intimately associated with that of the Norsemen, who were a part of her people, but from 1130 to 1240 the country suffered both in war and in commerce, and commenced a rapid retrograde movement which did not end until it was attached to Sweden in 1814. All titles of nobility were abolished in 1821, and in the struggle from 1872 to 1884 the right of veto was taken from the king. Then came a constitutional struggle of Norway against Sweden, Norway demanding consuls of her own and greater independence in her foreign policy. On June 7, 1905, the Norwegian legislature dissolved the union with Sweden, and on Oct. 16 the Swedish parliament ratified a treaty recognizing Norway's independence. In November Prince Karl of Denmark was called to the throne, and became king under the title of Haakon VII. Spitzbergen, most northern of inhabitable lands, was united to Norway in 1925.

Nor'wich, Ct., shares with New London the honor of being county seat of New London County. It stands at the head of the Thames, the chief portion of the town lying on an eminence between the Yantic and Shetucket, which here unite. It manufactures paper, cotton and woolen goods, cards, pistols, files, iron pipes, and has large leather belt factory, also tanneries and iron works. The town is well-known for its schools; Norwich Free Academy, an incorporated and heavily endowed institution, takes the place of a high school. An art school, a fine art museum and manual training are connected with this academy. The land on which it stands was given to an Englishman by Uncas, the chief of the Mohicans, in 1656. Population 28,219.

Norwich, the capital of Norfolk, England, a municipal county and parliamentary borough, lies on the Wensum, 114 miles from London, and covers an area of about 10,000 acres. It contains Pull's Ferry and Bishop's Bridge (1295), St. Giles' Hospital (1249), Ethelbert gateway (1300), Guildhall (1413), the music house, Bridewell and Dolphin inn, — all old buildings. It also has a cathedral, founded in 1096, which has a spire 315 feet high. The principal manufactures are crapes, mustard, starch, ironware, and boots and shoes. The city in olden times was often plundered by the Danes, then burned by Sweyn and held by Canute. It has been the seat of 65 bishops. Population 130,000.

Nose, the external organ containing the nostrils and connected with the sense of smell. Many lower animals possess the power of smell but have no nose. The nose proper begins in the vertebrate animals. The nostrils serve as paths for air into the respiratory passages. They lead also into the chamber of the nose, which is divided by a flat bony partition into right and left sides. The walls of each cavity are convoluted (*turbinated bones*), and covered with a soft membrane from which the nerves of smell pass to the brain. The sense-cells, which are especially modified for smelling, are located in the membrane, and the nerve fibers forming the olfactory nerve grow from them. The olfactory nerve usually enters into an olfactory lobe before making connection with the brain.

Not'ting'ham, the capital of Nottinghamshire, England, a municipal county and parliamentary borough, lies on the Trent, 126 miles from London. It was formerly surrounded by high walls, which have now disappeared, and the 20 square miles of the city have of late been much improved by the widening of the streets and the erection of new buildings. It contains a city hall, St. Mary's church, guildhall, University College, a library and museum, an old hospital and a Roman Catholic cathedral. The most important manufactures are lace and hosiery, but baskets, bicycles, cigars and needles are also manufactured. The principal events of its history are the occupation by the Danes until 868; destruction by fire in 1140 and 1153; its first charter in 1155, the convention of three parliaments and the raising of the standard of Charles I in the parliamentary war in 1642. Population 272,500.

No'va Sco'tia, the most easterly portion of Canada, is a peninsula thrust into the Atlantic from the east of North America. It is the most conspicuous physical feature between Florida and Newfoundland. Cape Breton, its eastern extremity, is really an island, separated by the Strait of Canso. Nova Scotia is 350 miles long, with a breadth varying from 50 to 100 miles, and contains an area of 20,907 square miles. The isthmus that connects it with New Brunswick is 13 miles wide, and on other sides it is washed by the Bay of Fundy, the Atlantic and the Gulf of St. Lawrence.

Surface. Its coast is indented with natural harbors, there being no fewer than 12 on the Atlantic seaboard capable of sheltering the largest vessels. The interior is intersected with chains of attractive hills, and dotted with lakes, and drained by rivers. Many of the rivers are navigable for short distances inland, and with the Bay of Fundy they produce the rich intervales and dikelands whose productiveness is one of the chief features of the province. Nova Scotia is a favorite tourist section. There are Minas Basin and the Evangeline District about Wolfville and Grand Pré, the picturesque Annapolis valley, La Have River, known as Nova Scotia's Rhine, and the marvellous beauty of the Bras d'Or lakes in Cape Breton. Cobequid Mountains strike across the north of Nova Scotia from Cape Chignecto to Cape Porcupine.

Inhabitants. The population is now about 550,000 largely of Canadian birth, chiefly British. There are 55,000 French (Acadians) and 41,000 Germans. The Roman Catholic religion leads as to numbers, next the Presbyterians, then the Baptists. The Intercolonial Railway enters at Amherst from New Brunswick. It runs to Halifax by Truro and Windsor Junction. The Dominion Atlantic Railway runs from Halifax north to Minas Basin and to Yarmouth.

Climate. The climate is temperate, being moderated winter and summer by the sea which surrounds the province. The mercury seldom falls to zero. Cape Breton has an ideal summer climate, and the entire province is noted for the longevity of its people.

Resources. Agriculture is the most valuable industry. Rich and cultivated farms can be had at low rentals. The dikelands are exceedingly rich, being fertilized by deposits from tidal waters. The apple is the chief Nova Scotia product. The valley of apple-orchards runs from Windsor to Annapolis, 80 miles, along the northern side of the province. Nova Scotia has the largest number of sailing-ships and steamers of any province in the Dominion engaged in its trade. The cod, lobster, mackerel and herring fisheries are very profitable, there being 24,000 men engaged in the industry. The coal-deposits are owned by the government and leased on a royalty system to mining companies. The province gets half its revenue in this way. There is no direct taxation for provincial purposes. It keeps up roads, bridges, etc., and thus lightens municipal taxation. The value of the coal-production exceeds $50,000,000. The Cape Breton mines are the largest producers, and have built up the port of Sydney, the population of which has quadrupled in ten years (now 10,000).

Education. Nova Scotia is especially proud of her free, public-school system, which is open to the children of all the people. In each of the 18 counties a high school or academy carries on the work of the public school to a higher plane, and universities carry the work still further and crown the educational structure. There also is a provincial normal school at Truro. Dalhousie College and the University (undenominational) are at Halifax. The University of King's College at Windsor is Anglican, and that of Acadia College at Wolfville is Baptist. St. Francis Xavier College at Antigonish and St. Anne's College at Digby are Roman Catholic. There are a Presbyterian Theological College at Halifax, a school for the blind and one for the deaf and dumb.

Halifax port is open all the year round and is the terminus of the Intercolonial Railway.

No'va Zem'bla, an archipelago and two islands in the Arctic Ocean, attached to the Archangel government of northern Russia, lying between Kara and Barents Seas. It is about 600 miles long and 80 wide, almost cut into two narrow strips by the sea-passage of Matochkin Shar. Nothing is known of the interior, and it is only visited by Russians and Norwegians to capture sea-fowl, seal, whale, walrus and dolphin. The country was known to the Novgorod hunters in the 11th century, and was rediscovered by Sir Hugh Willoughby in 1553, and has since that time afforded much search and interest. Much has of late been learned of the country, which may be said to be uninhabited since 1868, save for a small colony of Russian and Samoyedes, who subsist by hunting and fishing. The Russian name for the archipelago is Novaya Zemlya.

Novel, The. The novel is the most flexible and inclusive of modern literary forms. It may be said to have begun in Spain with Cervantes' *Don Quixote* (1604), which replaced the unreal and misleading romances of chivalry with a fidelity to history, scenery, life and manners and with a humor, pathos and wisdom which make it one of the great books of the world. Le Sage inaugurated the same tradition in France, directing it in his *Gil Blas* (1715), especially to circumstances and manners.

The English novel began with Richardson's *Pamela* (1740), a minute analysis of middle-class circumstances; with Fielding's *Tom Jones* (1749), a sympathetic and candid history of the experiences of an ordinary man; with Sterne's brilliant, witty and sentimental *Tristram Shandy* (1760); and with Smollett's lively and humorous adventures of *Humphrey Clinker* (1771). In the early 19th century, Jane Austen perfected Richardson's fidelity to the truth of daily life; and Scott inaugurated the counter-tendency of the historical romance. In this he was followed by Dumas and Hugo in France, where Balzac and others followed Smollett. Tolstoy in Russia and contemporary Spanish and Italian novelists have developed the method of Richardson. In the later 19th century in England, Dickens revived the manner of Smollett, treating peculiarities and extravagances with extraordinary liveliness and humor and with a humanitarian intention to show the interest and worth of the common man. Thackeray followed Fielding in fidelity and sincerity, adding the element of benevolent social satire. George Eliot added a new depth of emotion to the observation and sympathy of Richardson.

In the United States Cooper, under the influence of Scott, recorded the life of the Indian and the frontiersman, and in *The Pilot* inaugurated the sea-novel; while Hawthorne in three great romances pictured the inner life of the Puritan past in New England. Present tendencies are well-illustrated by the elaboration of national and social traits by Henry James and the study of sectional and economic differences by Mr. Howells. James aims to produce an illusion of reality by the artistic presentation of personal impressions of "the human spectacle." Howells seeks to present the actual and the commonplace as a source of social knowledge and moral obligation. Many contemporary novels follow the latter "realistic" theory; being devoted to business, labor and social conditions, problems and remedies. Perhaps the larger number follow the theory and practice of Marion Crawford, who considers the novel an intellectual, artistic luxury; its prime object being to provide interesting or amusing relaxation and recreation; although incidentally it may cultivate right feeling or exhibit characters and actions worthy to be desired or imitated.

The short-story, as it prevails today, is a development of the 19th century. Brief tales, of course, have existed from the earlier times. But it remained for Poe to show that a story short enough to be read at a sitting would be more successful if it had the completeness of impression resulting from unity of theme, harmony of parts, selection of detail and compression in expression. This strict conception of the form developed in France at almost the same time. Robert Louis Stevenson made it popular in England considerably later. Since Irving, Poe and Hawthorne the short-story has flourished in the United States as nowhere else, partly because of the prevalence of magazines as suitable media for publication and partly because of the unequalled opportunity for studies of sectional and local manners to which the form especially lends itself. In this way it has employed literary material too slight for extended treatment, and has become a pervasive and powerful influence toward a national breadth of knowledge and sympathy.

From this rapid survey it will be seen that the structure of prose fiction may be as varied as its content and that its content is limited only by the author's knowledge and imagination. Plots have often been complete, unified, varied and probable; but some, if not all, of these desirable characteristics have often been lacking. The action must be consistent in itself and with the characters; but it may be simple or complex, logical or surprising, slow or rapid. There usually is some sort of complication and unravelling; but the problem may be internal or external, of religion, patriotism, society, love, grief, ambition, art or what not. The good or the evil triumph or suffer, and the narrative requires or is independent of description, according to the author's view of life and of his art. The movement may be like that of the epic, the lyric or the drama; or like that of the essay, of travel-literature, of history, biography or autobiography; and it usually combines some characteristics from each of these. The characters may be many or few, independent or related, simple or developed, lively or profound, receptive or influential. They may be based upon the author's observation or evolved from his own nature. They may be reproductions of actual persons, embodiments of types or pure creations. They may represent their author's interests, his sympathies, his solution of life. They may be directly described or analysed, or they may be portrayed indirectly through an account of their appearance, words and deeds or through those of related characters. The setting and the accessories may be historical or contemporary; political, social or personal; intimately or slightly connected with the characters and action; occupying little or much attention. Humor, pathos and satire may be inherent or incidental. Literary structure and style may be used as a transparent vehicle for the story, or they may in themselves be a source of pleasure or discomfort. No novel is great in all of these aspects, and these by no means exhaust the field. But greatness consists in an approach toward the ideal in all; and one could scarcely find a better method of studying any particular piece of fiction than by inquiring how it measures up to such a list of possibilities.

Whether one prefers fiction which provides moral stimulus, intellectual culture, increase of knowledge and sympathy or merely the pleasure of forgetfulness depends upon each reader's mental habit and moral tone. Some fiction undoubtedly does harm by plausibly presenting unveracious views of life and its laws. But the appreciative reading of any of the notable fiction which has been here mentioned will open such a storehouse of profitable pleasure, that no thoughtful reader can ever again find satisfaction in anything less excellent. For, in the words of the Dean of Westminster Abbey at the funeral of Charles Dickens, when properly used, "the work of the successful novelist, if pure in style, elevating in thought, and true in sentiment, is the best of blessings."

Novem'ber, from the Latin for nine, was the ninth month of the Roman calendar year, when there were 30 days to the month of November and ten months to the year. Then it was given only 29 days, but Cæsar gave it 31, only to have it restored to 30 by Augustus. Its festivals are All Saints (1), St. Hubert (3), St. Martin (11), St. Catherine (25) and St. Andrew (30).

Nov'gorod ("new town"), a famous Russian city, capital of a government, is situated near Lake Ilmen on the Volkhoff River. In 864 Rurik, a Norseman, was invited here to rule, and with him begins the history of the country. In the 12th century the city, which then had 400,000 inhabitants, was the market of northeastern Europe, and its almost republican government ruled from the White Sea to River Petchora. In 1471 on account of the jealousy of the Moscow princes, Czar Ivan III destroyed Novgorod, deprived it of its liberties, and exiled its best citizens. Afterwards the port of Archangel was opened and the city began to decline. The oldest building is the Church of St. Sophia, founded in the 11th century, besides 30 other churches and the wall surrounding the Kremlin. Here is annually held the Nizhnii Novgorod fair, which transacts a large volume of business. Population 26,972.

Nu'bia, the modern name of a large African region, formerly part of Ethiopia, and extending on both sides of the Nile from Egypt to Abyssinia and from the Red Sea on the east to the desert on the west. Of late, Nubia has been called the Egyptian Sudan. It was under the rule of the Pharaohs, but under the 20th dynasty was recovered by native rulers, who adopted Egyptian civilization and later became Christianized. The country is now occupied by mixed races, probably descendants from the pure negro stock mixed with Hamites and with Semitic Arabs who invaded the land in the 7th century, and conquered it in the 14th. Until 1820, it was ruled by native Moslem chiefs, but in that year it was made a part of Egypt by Ismail Pasha, and so remained until 1881. The greater part of the country is arid desert, with small oases here and there on the route of caravans. The most fertile region is near Dongola. Its population, which consists chiefly of Egyptians, sedentary and nomad, numbers 240,382. See SUDAN.

Nucellus (*nû-sĕl'lŭs*), (in plants), the main body of an ovule, usually more or less invested by an integument or integuments. It is the nucellus which is really the megasporangium, and which contains the megaspore or embryo-sac. See OVULE.

Nucleus (*nū'klē̇-ŭs*), (in plants), a special protoplasmic body always found in cells. So far as known, every cell must contain nucleus and cytoplasm. In the process of ordinary cell division the initial steps are taken by the nucleus Ordinarily, the nucleus is a spherical body and is usually centrally placed. It is difficult to see under ordinary circumstances without the use of special stains which color it. See CELL.

Nu'ma Pompil'ius, the second Roman king, (who ruled 715–672 B. C.), successor to Romulus, was a native of Cures, in the Sabine country, and esteemed for his piety and wisdom. He was elected king by the Roman people and by the aid of supposed interviews with the nymph Egeria in the groves near the city began to draw up forms of religious institutions for the people, and was thus, according to story, the author of the Roman ceremonial. He reigned during 39 years of peace and happiness.

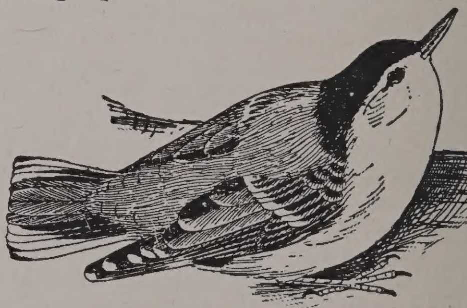
Numid'ia, the name given by the Romans to that part of Africa which is now Algeria, and reaching south to the Atlas Mountains. The inhabitants were of the race from which the Berbers are descended; were warlike, faithless, dishonest, yet excellent horsemen. In the war between the Carthaginians, Massinissa, the chief of the powerful eastern tribe, joined the Romans and later ruled the entire country. Of his successors Jugurtha and Juba are best known. After Cæsar conquered Juba I, Numidia became a Roman province, but Augustus gave the western part to Juba II. Among the more important places were Hippo, Raguis, Zama and Cirta, afterward called Constantina, and now Constantine.

Nur-ed-Din' Mahmud, emir and sultan of Syria, was born at Damascus in 1116 A. D. He is noted for his defeat of the first and second crusades of the Christians, the conquering of Tripolis, Antioch and Damascus, and the taking of all the Christian strongholds in Syria in 1151. In 1168 he was made sultan of Syria and Egypt, and while preparing to invade Egypt, died at Damascus in May, 1173. He was the bitterest enemy of Christianity, but was a patron of science, art and literature and a good administrator of justice.

Nu'remberg or **Nürn'berg,** a city in Middle Franconia, a province of Bavaria, stands on the River Pegnitz, 95 miles from Munich. It is one of the most interesting cities of Germany, with its old walls, gates, bridges and fountains. The castle, built by Conrad II and Frederick Barbarossa, is famed for its paintings and wood carvings. The most notable buildings are St. Lawrence church (1274), St. Sebald's church (1225), the Italian Renaissance town hall (1622), the gymnasium (1526), the new law courts, the Germanic Museum and the library of 70,000 volumes. The city has no foreign commerce outside of that in toys, known as Nuremberg wares, but has a large home trade in metal and wood specialties, bone carvings, type, lead pencils and chemicals. Nuremberg was first heard of in 1050, and became a free city in 1219. The Hohenzollerns sold their rights to it in 1417, and it immediately began to rise as the German home of arts and inventions and became a center of commerce. The discovery of the Cape passage to India and the Thirty Years' War proved the city's ruin, and although it retained its independence until 1803, it entered the Rhenish Confederation, and in 1806 became one of the cities of Bavaria. Population 332,651.

Nuta'tion, regular bending of plant parts, such as bud scales, flower leaves, stems etc., due to unequal growth on the sides. The stimulus inciting it may be light, heat or gravity. (See IRRITABILITY.) Thus the flowers of the tulip and crocus are sensitive to temperature changes of a few degrees, opening with rising and closing with falling temperature, because the growth of the outer face is hastened and that of the inner face retarded, and vice versa. When a cylindrical stem has its growth hastened on every side in regular succession, the tip describes a more or less regular circle, as in twining plants like the hop and morning glory. Some nutations are apparently spontaneous.

Nut'hatch, a small creeping bird seen running up and down the trunks of trees, getting its name from its habit of hatching open nuts it has previously wedged in the bark of trees. It is wonderfully nimble, an expert gymnast, finding it no trouble at all to walk along a limb head downward. It has a rather slender, strong straight bill, its sharp claws are well adapted for holding to the bark, the tail is short and square, and is not used in climbing. Its plumage is slate-colored and smooth, not fluffy like its cousin, the chickadee's. It is seen chiefly in winter, during nesting season seeking seclusion The white-breasted nuthatch is a common winter bird in the eastern part of the country, its cheerful "Yank! yank!



WHITE-BREASTED NUTHATCH

hank! hank!" welcome in the winter stillness; also welcome is the industry and success of its hunting for insect-eggs and larvæ. Other food to its liking, are nuts and seeds. It is frequently seen in friendly association with the titmice. Its slate-colored coat is relieved by black on top of the head and on the wings; its tail is rusty black touched with white; sides of head and under parts white. In the spring it retreats to the deep woods, patiently digs out a hole on a dead limb, lines this hole with feathers and other soft material, making a snug nest for the many white eggs — five to eight, sometimes 10. The red-breasted nuthatch is smaller than the preceding, and is more northerly in its range, nesting from Maine northward and in the mountains farther south.

Nut'meg, See SPICES.

Nutri'tion (in plants), the processes by which food is obtained and utilized. Plants obtain their food (which see) in two ways, by absorption and by manufacture. With a few exceptions, plants which obtain their food ready-made are unable to engulf it and must take it into the body in solution. (See ABSORPTION.) If insoluble in water, they must first digest it. (See DIGESTION.) All prepared food is derived directly or indirectly from other organisms. A few plants capture small insects for the sake of the food derived from their bodies. Parasites, that is, creatures growing on or in a living being (called, therefore, the host), derive their food directly from it; saprophytes in a similar way obtain their food from a dead organism. There is every possible gradation between parasites and saprophytes; and between saprophytes and green plants, which are able to make all of their food out of inorganic material. Yet many green plants absorb organic matter *i. e.*, matter once a part of a living being; this is the reason for applying fertilizers and manures to gardens and fields. Many, perhaps all, colorless plants can make the most complex foods (proteids), provided simpler foods and necessary salts are supplied. Only green plants, however, and of these only the green parts, can make carbohydrate foods, like sugars, starch and the like, out of carbon dioxide and water. (See PHOTOSYNTHESIS.) When these foods have been formed in sufficient amount, the green plants can also produce proteids. Most plants make more food than they require. Reserve food is stored, usually in solid form, in special tissues. These storage regions have been greatly improved by cultivation, the common vegetables (seeds, tubers, bulbs, roots, leaves, and even flower buds) being the product of proper breeding and of growing the plants under unusually favorable conditions for nutrition. In its broadest sense, nutrition includes the use of foods in assimilation, respiration and growth. These topics are separately treated. In the course of the chemical process of nutrition (see METABOLISM) a great variety of waste products arise, such as gums, resins, volatile oils, tannins, alkaloids etc. These the plant secretes and removes them thus from its general metabolism. See SECRETION.

C. R. BARNES.

Nyas'a or **Nyanja,** the most southern of the great East African lakes, is 260 miles from Tanganyika and 400 miles from the east coast. It is 1,570 feet above sea level, very deep, rapidly descending from its high and rocky shores, and measures about 350 miles long by 40 miles broad from east to west. It was known by the Portuguese as Maravi in the 17th century, but was first navigated by Livingstone, and its situation exactly determined in 1859.

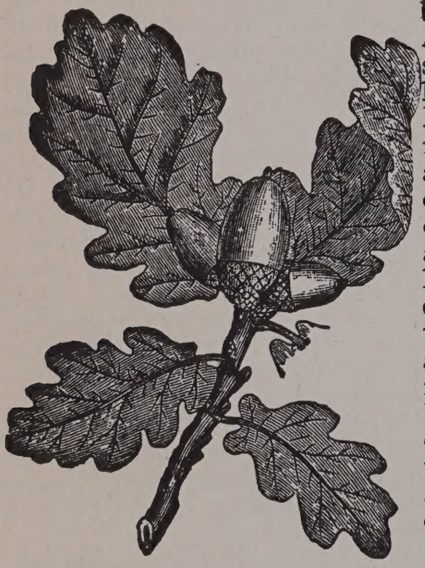
Nyasaland (*nē-äs'sä-lănd*), the name given to a British Central Africa protectorate, the country lying immediately south, west and northwest of Lake Nyasa, in East Africa. Its area is 40,980 square miles, population about 1,000,000 natives and nearly 700 Europeans. It has no outside boundaries, but is the region in which the African Lakes company of Glasgow operates in connection with the missionaries of the Church of Scotland, with principal stations at Blantyre and Bandawe. Nine missions are at work, and over 60,000 natives are at school. The company and mission stations were founded on the recommendation of Dr. Livingstone to check the Arab slave trade. It is now under the administration of the British foreign office, by a resident commissioner. Its products are rice, coffee, rubber, ivory and cotton. The capital is Zomba. Some trouble was caused in 1888–90 by the claim of sovereignty made by Portugal; but the sphere of the Portuguese Nyasa company, with a charter from the Portuguese crown, is the region between the Rovuma, Lake Nyasa and the Lurio. There are steamers on the lake and on Shiré River, two railways, telegraphs and 23 postoffices. See CENTRAL AFRICA PROTECTORATE.

Nymph (*nĭmf*), young of insects that undergo only incomplete metamorphosis, do not show marked change of form save in gradual growth of wings; as the young of crickets, grasshoppers, locusts and bugs. See METAMORPHOSIS.

Nymphs, of Greek mythology, were the female divinities of the lower rank, inhabiting the seas, streams, groves, meadows and pastures, caves, fountains, hills and trees. Of their different classes were Oceanides, nymphs of the great sea; Nereids, of the inner sea; Potameides, of the rivers; Naiads, of fountains, brooks, lakes and wells, and Dryads, of the trees and forests, who were supposed to die with the trees in which they lived. They were the goddesses of moisture, had power of prophecy, and guarded the nourishment and growth of infants. Many of the most beautiful Grecian sculptures are those of nymphs.

O

O, the fifteenth letter, is a vowel, and represents seven sounds. It is produced through the rounded lips, and is therefore classified as the labial vowel. Its principal sounds are the long one in *bone* and the short one in *nod.* Variants of these are heard in *orb*, *son*, *do* (*food*) and *wolf* (*book*). With other vowels it forms diagraphs and diphthongs. Anciently it was a numeral (11) as well as a letter, O with a bar over it being 11,000. O' with an apostrophe after it in Irish names is a prefix meaning *son of*, as O'Connell, son of Connell.



OAK-BRANCH IN FRUIT

Oak, species of *Quercus*, a genus containing about 200 species, all natives of the northern hemisphere. About 50 species belong to North America, and among them occur some of the finest and best-known of our forest-trees. They are easily recognized by their characteristic leaves and especially by their peculiar fruit, the well-known acorns. Among our most conspicuous species are the white oak (*Q. alba*), red oak (*Q. rubra*), scarlet oak (*Q. coccinea*), burr-oak (*Q. macrocarpa*), chestnut-oak (*Q. acuminata*) and live oak (*Q. Virginiana*). The white oak is a great, stately tree, 70 to 80 feet high, and still higher in the forest. In the open its branches spread wide. The bark is light gray in color, and not so rough as that of most hickories. The leaves are simple, alternate, obovate, bright green above and paler below; when young they are woolly and red; they turn dark red in the fall and may remain on the tree all winter. The acorns have rough cups, usually growing in pairs. The range is from Maine to Minnesota and southward; the tree is at its best on the western slopes of the Alleghanies. It is one of our most valuable timber-trees, the wood is used in shipbuilding, in the manufacture of carriages, for interior finish and for other purposes. The tree lives to a great age. The red oak grows under a variety of conditions. The tree grows 50, 80 or 150 feet high, has a round top, the foliage abundant but the leaves so attached that they give this tree of girth and height a light and airy appearance. The bark is reddish brown and comparatively smooth, the leaves are simple, alternate, dark green above and pale green below. The acorn-cup is shallow, the nut large. The wood is porous and not highly valued. In autumn the scarlet oak wears leaves of the most brilliant red, and at all seasons it is a very picturesque tree. It varies in height from 50 to 90 feet, sometimes higher; is narrow at the top; the bark rough and grayish-brown; the leaves large and lustrous. The acorns are quite large, the cup scaly. It is highly valued as an ornamental tree. The burr-oak is hardy, beautiful and a valuable timber. It is widely distributed — found from Montana to Pennsylvania and south to Texas, and also grows in Maine, Vermont and Massachusetts. East of the Alleghanies it is comparatively rare, and is at its best in Illinois, Indiana and the Mississippi Basin. In some regions it rises even 150 feet, but the average is about 75; with space for outreaching, the tree is wide-spreading. The bark is deeply furrowed and brownish-gray; the leaves are long, shiny and dark-green above, silvery white underneath. The acorns are very large, the cup is extremely rough and there is a noticeable fringe around the edge. The wood is dark brown, the strongest of the oaks, and is highly valued. The chestnut-oak is a magnificent tree, one of the most beautiful of the oaks. It rises tall and straight; its height 60, 70 or 100 feet, its leaves somewhat like those of the chestnut. The bark is light gray, almost white; the acorns are small and grow close to the branch. The bark is rich in tannin, the wood used in cooperage. The range of the tree is from Vermont to Alabama and westward, and it is found at its best in the mountains of Tennessee and North Carolina. The live oak is a beautiful southern form of oak, its leaves evergreen. The range is from Virginia southward near the coast to Florida, where the trees are especially abundant, and west to Mexico. It sometimes is no more than a shrub, sometimes rises 60 feet. It is a wide-spreading tree, the bark brown and deeply furrowed, the leaves dark-green, small and glossy. The yellow wood is strong but difficult to work, and takes a fine polish; it is valued in shipbuilding, and the bark yields considerable tannin. See Mathews: *Familiar Trees* and Lounsberry: *A Guide to the Trees*.

Oak-Apples, called also nutgalls and gallnuts, are round balls about as large as an apple, found on the leaves and stems of oaks and produced by the action of insects. The insect pierces the plant and injects an egg in the opening. The gall or apple grows rapidly and is fully formed before the egg hatches.

Oak'land, Cal. Across the bay of San Francisco, 4½ miles wide, and directly facing that city on the east, lies Oakland, a most beautiful, residential, industrial, and port city. Louis Maria Peralta, who marched into California with the troops of Spain in 1776, received this site as his personal property from the Spanish Crown in 1820. "To Luis Maria Peralta—land, five leagues in extent, running from the deep creek of San Leandro on the east to a hill adjoining the sea beach," reads the document. Great changes have taken place since then. A bridge connects San Francisco and Oakland; the population, less than two thousand at the beginning of the Civil War, is now about 325,000; eight other contiguous municipalities lie along the eastern shore of the Bay, with a population of over half a million; eight railways enter the city, and nearly 10,000 ships dock at its harbor yearly; great industries have located there, including ship building, motor car, electrical, canning, paint and soap. The University of California, largest in the United States, is at Berkeley, four miles distant; Mills and St. Mary's Colleges for girls are within the city.

To the east of Oakland lies a vast fruit hinterland — the agricultural produce of the Santa Clara valley is valued at $80,000,000 yearly.

Oasis (*ō'ȧ-sĭs*), a fertile spot in the desert, due to the presence of wells or underground springs. The French have made oases in the Algerian deserts by sinking artesian wells. Some African oases are large enough to be inhabited, and grow crops of rice and millet, and are shaded with palms.

Oats, species of the genus *Avena*, belonging to the grass family. The common cultivated oat is *A. sativa*. which is native to the eastern hemisphere. The genus contains about 50 species, which are widespread in the north temperate regions. In the United States three species occur, the purple oat (*A. striata*), Smith's oat (*A. Smithii*) and the common wild oat (*A. fatua*). The oat is hardy, thrives best in a cool, moist climate, and is extensively grown in the United States Canada and northern Europe. Russia and the United States rank first as oat-producing countries. The grain is of great importance as food for man and beast, the plant is valued for forage, hay and straw. It has few insect enemies, but is injured by rust and smut.

Oaxaca (*wä-hä'kȧ*), a state of Mexico, near the isthmus, is bounded on the north by Puebla and Vera Cruz, east by Vera Cruz and Chiapas, south by the Pacific and west by Guerrero. It contains 35,382 square miles and the population is estimated at 1,041,035,of whom the much larger part are civilized Indians. The greater portion of the area is mountainous, the Sierra Madre del Sur rising to a height of 12,000 feet, and running across the whole width of the state from east to west. The capital, of the same name, 210 miles southeast of Mexico City, has a population of 37,469. The resources are among the best in Mexico, its elevation giving it a considerable rainfall and a less oppressive climate than that found in several of the states of that country. Its soil is good, and wheat, coffee, sugar, cotton, cocoa, plantains, and fruits of all kinds are exported.

Ob'elisk, a memorial monument of stone with a pointed top. It usually has four faces, and is broadest at the base. These monuments were used by the Egyptians at the entrances of their temples, probably to record the honors and triumphs of their kings. They are covered with inscriptions in Egyptian hieroglyphics or picture writing. They are very ancient, going back to the 4th dynasty in Egypt, though the larger part date from the 18th and 19th dynasties. Two large ones, which stood at Heliopolis, were carried by Rameses II to Alexandria, and have been called Cleopatra's Needles. One of these was erected on the Thames embankment in London in 1878, and the other, presented by the khedive of Egypt to the United States, is in Central Park, New York City. There are others at Rome, Florence, Berlin and Paris. Washington Monument, finished in 1885 in the city of Washington, is the largest obelisk in the world. It is 55 square feet at the base, and 555 feet in height. See *Egyptian Obelisks* by Gorringe.

Oberammergau (*ō'bĕr-äm'mĕr-gou'*), a village in Bavaria, 45 miles southwest of Münich. It is celebrated as the place where the famous miracle-play representing the Passion of our Savior is played once in ten years. It is the only survival of the old miracle-plays, being excepted from the order abolishing them in Europe in 1779. Ir 1633, in gratitude for an escape from the plague which devastated the surrounding country, the people of the village vowed to perform this play once in ten years. The actors, in number 350 and the chorus of 80 members, are all taken from the villagers. It is played for twelve Sundays, in a large theater holding 5,000 spectators, many of whom are visitors from all parts of the world. See MIRACLE-PLAYS and *Homes of Ober-Ammergau* by Greatorex.

O'berlin, O., a town in Lorain County, near Lake Erie, 34 miles west of Cleveland. It is a college town, with some factories and business blocks. It is the seat of Oberlin College, established in 1833 and chartered as Oberlin Collegiate Institute. In 1850 the name was changed to Oberlin College. It is a coeducational institution, and, besides the college, theological seminary and academy, provides courses for graduate students. The number of instructors in all departments including the conservatory of music, is 142, the students in attendance 2,025, and the number of volumes in the library about 125,000. Population 4,365.

Obi (*o'bē*) or **Ob** is the great river of western Siberia. It rises in two branches in the Altai Mountains in the Chinese dominions, and flows north, 2,120 miles, into the Gulf of Obi in the Arctic Ocean. It is very little used for navigation, but with the growth of the country will probably become one of the great water-routes for commerce. Its chief tributary is the Irtish.

O'Brien, Most Rev. Cornelius, D.D., Ph.D., F.R.S. Can., Roman Catholic Archbishop of Halifax since 1882, was born in New Glasgow, Prince Edward Island, on May 4, 1843, and was educated at St. Dunstan's College in Charlottetown and at the Propaganda in Rome. He has been president of the Royal Society of Canada, for which he wrote *The Supernatural in Nature* and other papers His published works include *The Philosophy of the Bible*, *Memoirs of Bishop Burke;* and *Cabot's Landfall.*

Observ'atory, an institution equipped for the study of astronomical or meteorological phenomena. In distinction from a laboratory, which is a place where phenomena can be brought to pass and experiments tried, an observatory is a place for the observation of phenomena over which we have no control, as an eclipse of the moon or a sudden variation in the earth's magnetism. Those institutions which are exclusively devoted to observational work are the purely astronomical observatories. Scarcely any other kind existed previous to the invention of the spectroscope by Kirchhoff and Bunsen. Recently, however, a number of astrophysical observatories have been established — notably at Potsdam in Germany, Meudon in France, Tulse Hill in London and Cambridge, Washington, Allegheny, Columbus, Lake Geneva and Mount Hamilton in America. In these institutions many experiments have to be tried as well as many observations made; for the spectra of stars, planets, nebulæ, comets have to be interpreted as well as described. And their interpretation can be given only after experiment has shown how to duplicate them. Hence an astrophysical observatory is generally also a laboratory, provided with electrical, photographic and spectroscopic apparatus. The same is more or less true of a magnetic observatory.

The typical astronomical observatory is equipped with a clock and an instrument for correcting this clock from the passage of stars over the meridian of the place. It is provided also with a telescope, housed in a dome which can easily be opened to the sky on one side and easily rotated. The more important observatories of the world are: Yerkes Observatory at Lake Geneva, with a refracting telescope whose object glass is 40 inches in diameter; Lick Observatory at Mount Hamilton, Cal., with an objective of 36 inches diameter; Harvard Observatory at Cambridge, Mass., with a branch in Arequipa, South America; this institution employs between 30 and 40 workers and is making a superb spectroscopic survey of the heavens; Naval Observatory at Washington and McCormick at the University of Virginia each have 26 inch glasses, while Halstead Observatory at Princeton University follows with one of 23½ inches. Greenwich Observatory in England is a national institution, which has a brilliant history and is doing a great variety of work. The corresponding institution for France is Paris Observatory, and, like Greenwich in England and Pulkowa in Russia, it has a history of which it may well be proud.

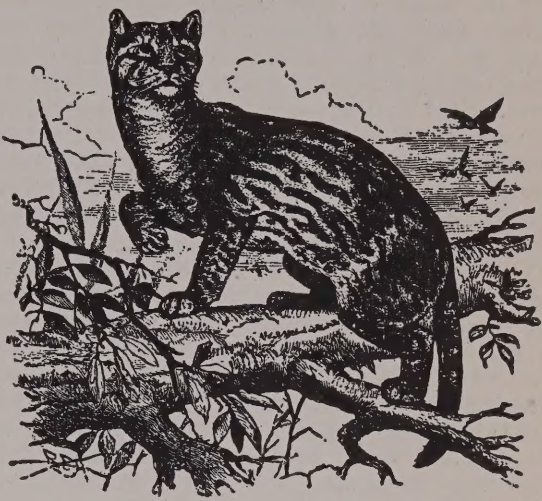
Obsid'ian, a natural glass, a variety of lava. It is hard, brittle, with a glassy luster, partially transparent, and with sharp edges that cut like glass. It is black, dark gray, green, red, brown, striped or spotted, a specimen usually having but one of these various colors. It is used for jewelry and ornamental articles, and in early times was employed for arrowheads, knives and mirrors. It is found in Yellowstone Park and other localities in the United States; in Iceland, the Lipari Islands, Vesuvius, Sardinia, Hungary, Spain, Mexico and South America.

O'cean-Cur'rents. There are some very remarkable currents in the great seas. Some are surface-currents and some move along on the very bottom of the sea. The latter are the great inflows of cold water from the polar regions. The surface-currents are caused by the winds, and are warm or cold according as they pass from a warmer or colder climate. The effect of these currents upon climatic conditions makes them of great importance. They may be considered as constituting two great and somewhat similar systems, the Atlantic and the Pacific, which may be subdivided into the North and the South Atlantic and the North and the South Pacific respectively. The currents of the North Atlantic are the North Equatorial current, the Gulf Stream (*q. v.*) and the North African current, which form a great circle with a large Sargasso Sea in the middle, and the Greenland and Labrador (*q. v.*) currents. The currents of the South Atlantic, are the South Equatorial, the Brazilian, and the South Connecting currents, which also form a circle with a Sargasso Sea in the middle. The currents of the South Pacific are the South Equatorial and Australian currents and of the North Pacific, the North Equatorial, Japan (*Kuro Sivo*) and Humboldt (Peruvian) currents. Charts showing the courses of these different currents will be found in almost any of the higher-grade school geographies, with some reference to their specific influences upon climatic conditions. Currents moving at a very slow rate of speed are called *drifts*.

Oce'ania or **Ocean'ica,** the islands and archipelagoes between southeastern Asia and western America. They comprise Polynesia, the Malay Archipelago and Australasia, all known poetically as, together, the island-world of the Pacific. See AUSTRALASIA, AUSTRALIA, HAWAII, MALAYS, NEW GUINEA, NEW ZEALAND and POLYNESIA.

Ocean-Routes. There are great ocean-routes just as there are great land-routes, great steamship-systems just as there are great railroad-systems. The principal ocean-routes run east and west, as do the principal railroad or land-routes. The one is, as it were, an extension or continuation of the other. The ocean-routes may be divided into two great divisions, the Atlantic and the Pacific. The Atlantic routes are many, connecting almost all ports of the eastern coast of the American continents and Europe. The Pacific routes are not so many and are not yet so much traversed, though the near future is sure to witness a great change in respect to this. The principal Pacific routes are the Puget-Sound route; the San Francisco-Honolulu-Yokohoma route; the Yokohoma-Hong-Kong-Singapore route to Europe, connecting there with the Atlantic routes; and the less traversed Puget Sound-Honolulu-Sidney; San Francisco-Honolulu-Sidney; Yokohoma-Hong-Kong-Sidney; Puget Sound-Manila; San Francisco-Manila; and Mid-Pacific routes. The Puget Sound route is the shortest route between America and Japan and is traversed by about all vessels sailing for Yokohoma from Vancouver, Seattle, Tacoma or Portland and frequently by vessels sailing from San Francisco. The distance from Vancouver to Yokohoma by the Puget Sound route is only 4,560 miles. The San Francisco-Honolulu-Yokohoma route is 7,560 miles or 3,000 miles longer than the Puget Sound route. It has the advantage of the intermediate port of Honolulu and is much traversed. The San Francisco-Honolulu-Manila route is 9,005 miles, while the Puget Sound-Manila route is only a little over 6,000 miles.

Ocelot (*o'sé-lot*), a leopard-like cat that has come from the tropics into some of our southern states, is frequently met in southern Texas and occurs in lower Louisiana. It varies in length from two to three feet, and a full-grown animal reaches a weight of twenty-five pounds. Its fur is tawny or reddish-gray, marked with black spots, stripes and bands. The black color sometimes is in the form of a ring inclosing a spot somewhat darker than the general color of the fur. The ocelot is an agile climber, spends a good deal of time on the lower branches of trees on the lookout for prey; and feeds chiefly on birds and small quadrupeds. It sometimes is known as the tiger-cat, and as a rule is bad-tempered.


OCELOT

O'Con'nell, Daniel, the Irish liberator, was born in County Kerry, Aug. 6, 1775. He was admitted to the Irish bar in 1794 and became famous as counsel, the counselor being one of the titles by which he was known among his followers. His large practice, worth, he said, $35,000 a year, was sacrificed for his country, when he took a leading part in Irish politics. He was head of the Roman Catholic party and contended for the admission of Catholics to Parliament, which he secured in 1829. In 1823 the Catholic Association formed by him became very powerful, with a large income. He entered Parliament in 1829, supporting the Whig party during the reform struggle, advocating free trade in corn, negro emancipation, the repeal of the laws against the Jews and universal suffrage. One of the greatest of orators, his remarkable speeches in Parliament, one of which lasted for seven hours, were equaled only by his popular addresses throughout Ireland. In 1840 he founded his famous Repeal Association, the members of which paid from $50 to 25 cents annual fees, and which in 1843 had an income of over $200,000. In 1844 O'Connell, with his son and five others, was tried for sedition and sentenced to imprisonment for one year and a fine of $10,000; and, though the house of lords soon set aside the verdict, fourteen weeks in prison brought on the ailment of which he died. The new party of Young Ireland now separated from O'Connell because of his unwillingness to use force in obtaining the independence of his country, withdrawing from the Association. The potato famine followed. Sick with the sight of the suffering of his country, sad with the consciousness of failure and worn out with a struggle with disease, O'Connell left Ireland for Rome, longing to die there, but only reached Genoa, where he died May 15, 1847. His heart, at his own request, was carried to Rome, and his body buried at Dublin, at the base of a tower 165 feet high. See *Leaders of Public Opinion in Ireland* by Lecky; *O'Connell* in the Statesmen Series; and *Life* by his son.

O'Connor, Thomas Power, an Irish statesman, was born at Athlone, County Roscommon, Oct. 5, 1848. He was educated at the College of the Immaculate Conception, Athlone, and at Queen's College, Galway, graduating with honors in 1866. He entered journalism in Dublin the next year, going three years later to London. In 1876 Mr. O'Connor published the first volume of his *Life of Benjamin Disraeli*, but later republished it as *Lord Beaconsfield*, condensing all his material into one volume. In 1880 he entered Parliament as member for Galway, and was returned both for Galway and Liverpool in 1885. He chose to accept the latter, and has represented one division of that city ever since. In 1883 he was elected president of the Irish National League of Great Britain. He has edited a *Cabinet of Irish Literature*, and published *The Parnell Movement*. In 1891 he issued a *Life of Parnell*. Mr. O'Connor still is a member of Parliament and is editor-in-chief of *The Era*.

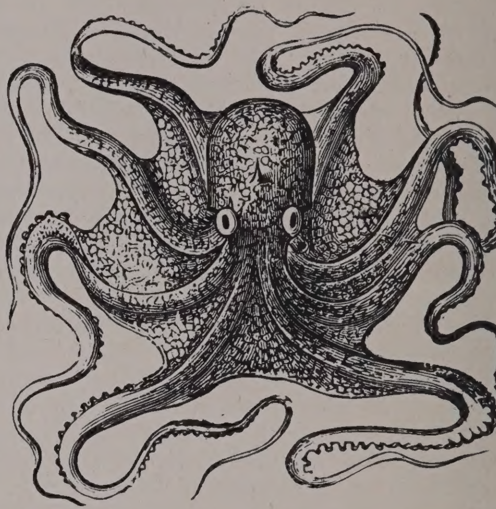
Oconto, Wis., a town on Green Bay, at the mouth of the Oconto River. It has large sawmills and a large trade in pine lumber. Population 5,629.

Octa'via, the sister of the Emperor Augustus, was the wife of Mark Antony, whom she married in 40 B. C. to secure his reconciliation to her brother. Though she was noted for beauty, noble disposition and womanly virtues, Antony forsook her in a few years for Cleopatra. In 23 B. C. war broke out between Antony and Augustus, and he sent Octavia a divorce. She showed her noble character by caring for the children of Cleopatra with her own after the death of Antony. She died in 11 B. C. See Shakespeare's *Antony and Cleopatra*.

Octávian, See AUGUSTUS.

Octo'ber, from the Latin *octo*, meaning eight, was the eighth month of the year at Rome, but became the tenth when Numa changed the beginning of the year to the first of January. The Roman senate made many attempts to change the name.

Oc'topus, also called devilfish, a mollusk related to the squid. It has no shell, either external or internal, and belongs to the class (*Cephalopoda*) called in general cuttlefish. It has eight arms provided with suckers, arranged around a central soft, baggy body. The squid (which see) has ten arms. The body of the octopus is rounded, with large staring eyes, and situated in the center of a membrane which serves to connect the bases of the arms. There are a number of species. They live amid coral reefs or rocks, and feed on mollusks and crustacea. The common octopus of the West Indies and the Mediterranean is about nine feet long and weighs about sixty-eight pounds. It is eaten in the Mediterranean ports, and the flesh is also used for bait. On our Atlantic coast from Cape Hatteras down, a species occurs. One species found in the Pacific is sixteen feet long and has a spread of about twenty-eight feet. The body is so small in comparison to the length of the limbs, that it measures only six inches in diameter and one foot in length. Some authorities declare the octopus is naturally timid and will not attack human beings, calling the lurid description in Victor Hugo's *Toilers of the Sea* a pure creation of fancy. Others affirm that pearl-divers and shell-collectors have fallen victim to them. Workers on the reef perhaps were frightened to death by sight of the monstrous, circling arms, staring eyes and powerful teeth.



OCTOPUS

O'der, one of the main rivers of Germany, rises in Moravia, crosses Silesia, Brandenburg and Pomerania, and finally empties through three channels into the Baltic. It is 550 miles long, but owing to its rapid fall and the sediment left at the mouth of its many tributaries navigation is difficult, and great expense is necessary to prevent its overflowing.

Odes'sa, the fourth city in Russia, a seaport of the Black Sea, about half way between the Dnieper and Dniester Rivers. It is built facing the sea, on cliffs, with deep ravines, and with galleries hollowed out of the soft rock, in which many of the poorest people live. It is a modern city, founded in 1794 near an old Turkish fort, but has grown rapidly, being the chief shipping-port for the corn-growing districts of southern Russia. The harbor is protected by moles against the dangerous winds of the Black Sea, and is menaced by ice hardly more than a fortnight in the whole year. The trade is largely in grain, principally wheat, but sugar, wool and flour are also exported. It also has sugar and oil refineries, and tobacco, leather, soap and chemicals are manufactured. It has a university with 1,714 students, a public library, historical museum, cathedral, opera-house and great grain warehouses and elevators. Water is brought to the city from the Dniester by an aqueduct 27 miles long. Odessa is known as a home of the cholera, for its persecution of the Jews and as headquarters of the nihilists. Population 520,000.

O'din, the chief god of Scandinavian mythology. He is not the creator of the world, but its ruler and the ruler of heaven. His home is in Asgard, whence he sends forth daily his two black ravens, *Hugin* and *Munin* (Thought and Memory), to bring news of all that is happening in the world. As god of war he holds his court in Valhalla, where all brave warriors gather after death. He became the wisest of gods by drinking from Mimer's fountain, but at the price of an eye. Frigga is his queen, though he had other wives. His Saxon name, Woden, is perpetuated in our Wednesday or Woden's day.

Œdipus (*ĕd'ĭ-pŭs*), a hero in Greek legend, whose story is the subject of some of the finest tragedies of Sophocles and Euripides. He was the son of Laius, king of Thebes, who, having learned from an oracle that his own son would kill him, exposed him at his birth. He was discovered by a herdsman, named Œdipus from his swollen feet, and brought up by the king of Corinth as his own son. Learning from an oracle that he was to kill his father and marry his mother, he went to Thebes to escape his fate. Drawing near the city, he met the chariot of the king and was ordered out of the way, which brought on a quarrel in which he slew his father, not knowing him. The Thebans offered the kingdom and the hand of the queen to whoever would deliver them from the Sphinx, who proposed to all who passed her a riddle, putting to death those who could not solve it. Œdipus offered himself, and she asked: "What being has four feet, two feet and three feet and only one voice; but whose feet vary, and when it has the most, is weakest?" Œdipus answered: "Man," at which the Sphinx threw herself headlong from the rock where she sat. Œdipus thus became king and the husband of his mother. When a plague devastated the country, the oracle promised relief when the murderer of Laius should be banished, and Œdipus learned from a seer that he had fulfilled the prediction of the oracle and killed his father, and for a wife had his mother. In horror he put out his eyes, while his mother hanged herself. He wandered away with his daughter, Antigone, and near Athens was taken from earth by the Eumenides.

Oer'sted (*ĕr'stĕth*), **Hans Christian,** a distinguished Danish physicist, who first discovered a connection between electricity and magnetism, was born on Aug. 14, 1777, and died at Copenhagen, March 9, 1851. He was educated in Copenhagen, where he took his doctor's degree in 1800, and in 1806 he was appointed to a professorship in physics. On July 21, 1820, he was passing the current of a large battery through a platinum wire, when he discovered that a magnetic needle near by was deflected. As shown by its consequences, this proved to be an epoch-making discovery, for which the Royal Society awarded him the Copley medal and the Paris Institute a mathematical prize amounting to 3,000 francs. See AMPÈRE.

Offenbach (*ŏf'fen-băk'*), **Jacques,** a Franco-Jewish composer, was born at Cologne, Germany, June 21, 1819. He settled at Paris, and became manager in one of the theaters. He composed a great number of operettas, but is best known for a series of burlesque operas, which make him the father of the modern comic opera. The *Grand Duchess*, *The Beautiful Helen*, *Genevieve of Brabant*, *Barbe-bleue* and *Madame Favart* are among the most notable, the last being very popular in England. He died at Paris, Oct. 5, 1880.

Og'den, Robert Curtis, American educator and magazine-writer, was born at Philadelphia, Pa., in 1836. He received the degree of A. M. from Yale, and LL.D. from Tulane University. Mr. Ogden is president of the trustees of Hampton Institute and a trustee of Tuskegee Institute. (See HAMPTON and TUSKEGEE). He also is president of the Southern Education Board and a member of many educational associations.

Ogden, Utah, county-seat of Weber County, at the union of Weber and Ogden Rivers, where the Weber passes through Wahsatch Mountains. It is situated 37 miles north of Salt Lake City, and is 4,340 feet above the sea. It was founded by Brigham Young in 1848-50, is in a rich agricultural and mining region, while at the city limits is the opening of Ogden Cañon. The picturesque beauty of this place attracts many tourists, and the water-power of the falls is utilized by the electrical works, which supply light and heat for Ogden and Salt Lake City. It is a railroad center, and has a Methodist university, a foundry and large mills, canneries of fruit, pickle factories, beet-sugar factories and woolen mills. It has public and parochial schools, other excellent educational institutions and the service of five railroads. The population in 1930 was 40,272.

Ogdensburg (*ŏg′dĕnz-bûrg*), a city and port of entry in St. Lawrence County, New York, is situated on the St. Lawrence River opposite Prescott, Ontario, 175 miles northwest of Albany. This city is the terminal of deep-water navigation on the Great Lakes and has regular steamship connections with the most important points. It also has excellent transportation facilities by rail. Among the notable buildings of the city are St. Mary's Academy, the Custom House, the Armory, the St. Lawrence State Hospital, the Federal Building and a Roman Catholic cathedral. There is an important trade in grain, lumber and general produce, as well as manufactured products, which include lumber, brass goods, newsprint, paper, and silks. In 1930, the population was 16,915.

Oglesby (*ō′glz-bĭ*), **Richard James,** an American soldier and statesman, was born in Oldham County, Kentucky, on July 25, 1824. He worked at the carpenter's trade and studied law until he was twenty years of age. He began the practice of law in 1845 at Sullivan, Illinois. Oglesby served as a first-lieutenant in the Mexican War, and at its close, returned to his profession at Decatur. On the outbreak of the Civil War he resigned his seat in the State Senate, to which he had been elected in 1860, and plunged into the contest, leaving for the front at the head of the Eighth Illinois. He participated in the battles of Fort Henry and Donelson, commanding a brigade on both occasions. He was severely wounded at Corinth, but in April, 1863, he returned to duty as a major-general in command of the sixteenth corps. He was elected Governor of Illinois, and served in that capacity from 1865 to 1869. He was re-elected in 1872, but was chosen United States Senator in January of 1873. He again served as Governor from 1885 to 1889. He died at Elkhart, Illinois, on April 24, 1899.

Oglethorpe (*ō′g′l-thôrp*), **James Edward,** an English General and the founder of the State of Georgia, was born at London on December 21, 1698. He served in the army, and sat in the Parliament for thirty years. He planned a colony in America as a refuge for debtors, then imprisoned in jails, and for persecuted German Protestants. George II granted the land, which was named Georgia after him, and Parliament contributed £10,000 ($50,000). In 1733 Oglethorpe set sail with 130 persons, and established the settlement called Savannah in America. Another party, including the two Wesleys, went out in 1735. In 1738 Oglethorpe returned to Georgia with a regiment of 600 men, in anticipation of a war with Spain. He invaded Florida, and was unsuccessful in an attack on St. Augustine, but repulsed a Spanish invasion of Georgia. He left the colony in 1743, and surrendered the charter to the British Government in 1752. He died in England on January 30, 1785.

Ogowe (*ō-gō-wā′*), a river of French Congo, is situated in the western part of Africa and flows into the Atlantic near Cape Lopez. In the rainy season it is a deep, broad stream, although numerous islands and sand-banks prevent large vessels from ascending it. In the dry season it shrinks to a narrow current. It is 700 miles in length, and forms a wide delta covering seventy square miles. The river was discovered by Du Chaillu in 1856.

Ohio (*ō̇-hī′ō*), "the Buckeye State," a North Central State of the United States, is bounded on the north by Lake Erie and Michigan; on the west by Indiana; on the south by Kentucky and West Virginia, and on the east by West Virginia and Pennsylvania. The word "Ohio" is of Indian origin, and means "beautiful river." The State ranks thirty-fifth in size in the Union, having an area of 41,040 square miles.

Surface and Drainage. Ohio consists of a plain and low plateau, with no extreme elevations. It averages 850 feet above sea level, and reaches its highest elevation in the center, sloping northward to Lake Erie and southward to the Ohio River, which follows the southern and much of the eastern boundary line. A ridge enters almost at the northeastern corner and crosses the State in a southwesterly direction, with its highest point, 1,540 feet, at Bellefontaine. The surface of the State is generally level or rolling, with west central prairies and some rougher land in the southeastern portion of the State. In 1800 Ohio was chiefly covered with hardwood forests, including some white pine. During the nineteenth century, however, there was such extensive and continuous cutting of timber that the merchantable woods of the State were practically destroyed. There is now remaining less than 8,000 square miles of wooded area, including the stump land. The most common trees are oak, hickory, ash, poplar, pine, elm, birch, locust, beech, chestnut, catalpa, hemlock and walnut. Ohio is drained by Lake Erie and the Ohio River, and the tributaries to these great bodies of water. The principal rivers flowing to Lake Erie are the Cuyahoga, Sandusky, Vermilion, Black, Rocky, Grand and Ashtabula; those emptying into the Ohio are the Muskingum, Scioto, Great Miami and Little Miami. In the northern three-fifths of the State the soils are of glacial origin, and comprise marl, sand, clay and gravel. The soil of the southern section is chiefly formed from weathered limestone. Almost all of the land is fertile and rich. In some places there are large collections of boulders. There are prehistoric mounds in Newark, near Chillicothe and on the Miami bluffs near Waynesville. Many implements and relics of prehistoric man have been found throughout the State.

Climate. The climate of Ohio is characteristic of that of the north temperate zone. The mean annual temperature is about fifty-one degrees. There are no unhealthful regions. Abundant rainfall waters the State, the mean annual precipitation measuring about thirty-eight inches.

Minerals. The mineral resources of Ohio are extensive. The State ranks first in the Union in the production of clays and of lime, second in iron and steel products, and sixth in the value of mineral wealth extracted. Cleveland handles more ore than any city in the world. In 1931, there were produced 695,000 short tons of lime, and 430,000 tons of hydrated lime. In 1932, there were produced 13,350,000 tons of bituminous coal; 2,505,000 tons of pig-iron, and 4,597,000 barrels of petroleum. The value of the clays in 1930 was $61,449,555; and of the total mineral output exclusive of pig-iron, in that year, $186,971,555. Other important mineral resources of the State are sandstone, glass sand, salt, gypsum, and potash.

Production and Industry. The rich fertile soil of the Ohio plain has caused an extensive agricultural development. In 1930, there were 219,296 farms which comprised 21,514,059 acres. The chief agricultural crops and their production in 1930 were: corn, 121,872,000 bushels; oats, 45,344,000 bushels; winter wheat, 32,308,000 bushels; potatoes, 11,583,000 bushels; hay, 2,496,000 tons, and tobacco, 32,940,000 pounds. Many vegetables and fruits are raised for canning, which is an important industry. Berries are especially profitable, with strawberries the leading crop in small fruits, closely followed by raspberries, blackberries, and dewberries. The 1931 wool clip yielded 15,543,000 pounds. On January 1, 1932, there were in Ohio 469,000 horses; 32,000 mules; 1,610,000 cattle, of which 1,120,000 were milch cows; 2,072,000 swine, and 2,164,000 sheep. The State fisheries are almost entirely confined to Lake Erie, where herring, German carp, blue and wall-eyed perch, sauger, pike, pickerel and whitefish are chiefly caught.

Although agriculture is important, the chief interests of the State are in manufacture, mining and oil. Ohio ranks third in number of industrial employés and fourth in the value of product. In 1929 there were 11,815 industrial establishments with 737,469 employés who earned $1,103,938,912 and produced goods valued at $5,999,123,993. Of the 264 industries classified in the 1929 census, Ohio ranks first in eighteen, and has considerable production in 218 of them. Iron and steel ore and reduction and machinery interests lead all others. In 1929, there were eighty-eight steel works and rolling mills with 89,123 employés, and twenty-six blast furnaces. Other important industries include automobile manufactories, foundries, machine shops, manufactures of electrical machinery, and structural iron works. There is a large output of rubber tires and inner tubes. Petroleum refining is important. The cement production in 1931 amounted to 6,068,958 barrels.

Transportation. Ohio has excellent transportation facilities. In 1931 there were 8,732 miles of steam railway, and 2,049 miles of electric railway. There are 11,589 miles of State-maintained highways, of which all but 119 miles are surfaced. Water transportation facilities are extensive. The Ohio River affords 430 miles of navigable waterway, an important traffic route down which much tonnage is sent. The Muskingum River in the southeastern part of the State is navigable for 100 miles. There are also 230 miles of lake frontage, affording to Ohio the entire Great Lakes system of waterways with all its advantages for trade. This combination of the lake on the north and the Ohio River on the south and east gives unusually extensive water transportation for a centrally-located State. Canals add greatly to the water facilities. Lake Erie and the Erie Canal afford a direct outlet to the Atlantic seaboard. By means of the western Great Lakes and the Sault Ste. Marie Canal there is a good water route to the Northwest. The Ohio and Muskingum rivers afford communication with Pennsylvania and the Mississippi Valley States. Ohio was one of the first states to expend money on canals, formerly of much more importance than at present. In addition to the Miami and Erie, from Cincinnati to Toledo, there are in the State, the Ohio Canal, from Cleveland to Portsmouth; the Hocking, from Carroll to Nelsonville, and the Walhonding, from Rochester to Roscoe.

Population. The population of Ohio in 1930 was 6,646,697, an increase of 15.4 per cent over that of 1920. Of this population, 67.8 per cent were urban, 9.7 per cent foreign born whites, and 4.7 per cent Negro, an increase of sixty-six per cent in Negro population in the decade. Ohio is densely populated, being fourth in rank in population in the United States. This is due in part to its great cities, chief among which are the following, with their populations in 1930: Cleveland, 900,429; Cincinnati, 451,160; Toledo, 290,718; Columbus, 290,564; Akron, 255,040; Dayton, 200,982; Youngstown, 170,002, and Canton, 104,906.

Education. Ohio is a State with a notably great development along educational lines. In the Ordinance of 1787 there was contained a provision which seems to have been adopted almost as a motto for the State in educational development. That lofty declaration, incorporated in the State Constitutions of 1802 and 1851, read: "Religion, Morality and Knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall be forever encouraged."

In 1930 the State illiteracy was 2.3 per cent, of which only 0.7 per cent was existent among native whites, 11.6 per cent among foreign-born whites and 6.4 per cent among Negroes. School attendance is compulsory from six to eighteen years of age. In 1932, there were in Ohio 6,472 public elementary schools, with an enrollment of 831,319 and a faculty of 24,998; 1,309 public high schools, with an enrollment of 208,164 and a faculty of 11,140, and thirty-eight teachers' training institutions, with an enrollment of 13,628 and a faculty of 1,632.

Ohio is noted for its higher institutions of learning. There were in 1932, forty universities and colleges within the State. Ohio State University, founded at Columbus in 1872, is the most important of these institutions, with 14,900 students and a faculty of 982. Other important institutions, with their 1932 enrollments are: Western Reserve University, 10,520; Cincinnati University, 4,086; Miami University, 2,347; Ohio University, 2,165; Toledo University, 1,750; Oberlin College, 1,660; Ohio Wesleyan University, 1,566, and Municipal University of Akron, 1,322. The Case School of Applied Science at Cleveland is nationally famous. The Teachers' Reading Circle, an educational development, began in Ohio in 1882 and has become of national scope. The Department of Public Welfare controls the charitable and correctional institutions which include State institutions of almost every type. The State penitentiary is located at Columbus, and the prison farm at London. Near Dayton is situated the National Military Home for Disabled Volunteers of the Civil War, which has accommodations for about 6,000 inmates.

Government. Ohio is considered to be a politically pivotal State, and is distinguished among the States for its tense political life. It has given the United States five Presidents, all native born, and two others born in Ohio, but elected as residents of other states. The State is divided into eighty-eight counties, with the capital at Columbus. The Senate of thirty-five members and the House of Representatives of 130 members are both elected for two-year terms. Ohio is represented in the National Congress by two Senators and twenty-four Representatives. An interesting point in the government of the State is the fact that the question of a general revision of the Constitution is submitted to the people every twenty years. Provision has been made by law for the election of a Convention to determine amendments and alterations.

History. The land of Ohio was probably first seen by white men about 1670, when La Salle discovered the Ohio River, and sailed as far as Louisville Rapids along its course. In 1679 he followed its shores on Lake Erie as he went to the Mississippi Valley. The territory was under French control until the French and Indian War, when the English obtained it. It formed part of the ocean-to-ocean grants made by England to various colonies along the Atlantic seaboard. During Revolutionary Days, George Rogers Clark marched through the land and took possession of all territory as far west as the Mississippi River, for the United States. The region was first organized as a county of Virginia. In 1749 a grant of 500,000 acres was made to the Ohio Company for settlement within the present limits of West Virginia and Ohio. This Company was chiefly composed of Virginia planters. The efforts of Virginia to extend jurisdiction over that section beyond the Ohio River led to the French and Indian War. In 1763 the English Parliament, with utter disregard of the claims of the American colonies, annexed the region to Quebec by act of Parliament. Some of the States held claims, indefinite and conflicting, to sections of this territory, all of which were ceded to the Federal Government between 1780 and 1800. In 1786 the Northwest Territory was formed and included most of the present states of Ohio, Indiana, Michigan, Illinois, Wisconsin, and part of Minnesota. The year following was organized the Ohio Company of Associates in New England, of ex-soldiers of the American Revolution. Under their supervision a large tract of land was bought in the territory northwest of the Ohio River, by soldiers who paid for it in "Continental Certificates" which they had received for their services in the war. This transaction was the first public sale of land by the Government of the United States. These colonists founded in 1788, Marietta, the first settlement in the State, and Losantiville, now Cincinnati. Until 1791 settlements in the southern part of the Northwest Territory increased rapidly. In that year disturbances with the Indians began to retard colonization. These difficulties persisted until General Anthony Wayne in 1794 gained an important victory in the battle of Fallen Timbers, on the Maumee River. This resulted in the treaty of peace concluded at Fort Greenville in 1795, in which the Indians ceded a large portion of the territory. A territorial government was then established with the seat at Chillicothe, where a capitol building was erected. Homeseekers entered the State rapidly after the solving of the Indian problem. In 1800 the greater part of the Northwest Territory was separated from Ohio and organized as Indiana Territory. In 1802 the present boundaries of Ohio on the east, south and west were fixed, the northern boundary remaining a matter of contest until 1836. In 1803 Ohio was admitted to the Union as a State.

The capital was first situated at Chillicothe, removed to Zanesville in 1810, and to Columbus in 1816.

During the War of 1812 the State militia were defeated by the Indians under Tecumseh. In 1813 Proctor and Tecumseh, with a British and Indian force, besieged Fort Meigs, and in the same year a battle was fought at Fort Stephenson, which is now Fremont. General Harrison, however, prevented actual occupation of Ohio by the British, and Perry achieved a signal victory on Lake Erie on September 10, 1813. The opening of the Erie Canal in 1825, and the Ohio and Miami canals in 1835 greatly aided the development of the State. There were several attempts to abrogate the provision of the Ordinance of 1787 forbidding slavery in the State. Ohio was largely settled by southerners in the southern part of the State, and there was strong sympathy for States' Rights in some sections. A strong anti-slavery faction early developed in the northern part of the State, however, centering in Salem, where the *Anti-Slavery Bugle,* the periodical of the

Western Anti-Slavery Society, was published. During the Civil War, the Knights of the Golden Circle were prominent. Ohio was a loyal Union State in this struggle, furnishing its full quota of troops, and also several of the most distinguished Union generals, including Grant, Sherman, McDowell, Rosecrans and Garfield. In 1863, General John Morgan and his Confederate forces raided the southern part of the State several times but was captured near Salineville. The State has been fortunate and prosperous. In recent times there have been some difficulties, including the coal strikes of 1914, which caused heavy losses to industry. Troops were called in to quell the violence in the mining districts. In 1913 serious floods caused a small loss of life and destroyed property valued at more than $2,000,000,000.

Ohio, a river of the United States, one of the largest branches of the Mississippi. It was named by the French explorers La Belle Riviere in accord with the meaning of the Indian name "The Beautiful River." It is formed by the union of the Allegheny and Monongahela Rivers at Pittsburgh, Pennsylvania, and flows southwest for 1,283 miles, joining the Mississippi at Cairo, Illinois. It is from 400 to 3,000 feet wide, spreading out so as to become quite shallow in dry seasons. It is subject to floods from the accumulation of snows in the mountains near its headwaters. There is a series of terraces along the banks, which have evidently been the bed of the river. The boundary between Ohio, Indiana and Illinois on the north and West Virginia and Kentucky to the south, is formed by the Ohio. At Louisville are falls, which are passed by means of a ship canal. The river is navigable for its entire length, and carries enormous fleets of boats laden with coal besides other products of the regions.

Ohio State University, organized as Ohio Agricultural and Mechanical College, was opened in 1873 at Columbus, Ohio. By legislation in 1878 the name was changed to The Ohio State University. The university is maintained by annual grants from the United States and from the State. It comprises colleges of agriculture, arts, philosophy and science, engineering, law, veterinary medicine, pharmacy, education, medicine, dentistry and a graduate school. The university is open to both sexes, and is nonsectarian. In 1932-33, the university had an enrollment of 15,645 and a faculty of 682. It has a library of 150,000 volumes and an annual income of $1,750,000.

Ohm (*ōm*), **Georg Simon**, a German mathematician and physicist, was born at Erlangen on March 16, 1787. He was educated at the university of his native town, where he received his doctor's degree in 1811 after which he began to teach. In 1827 he published his great work on the galvanic circuit, in which he proved the simple relation existing between current, resistance and electromotive force, a relation known as Ohm's law. For this discovery Ohm was awarded the Copley medal by the Royal Society in 1841. In 1846-49 Kirchhoff extended this law and established two theorems known as Kirchhoff's laws, which include Ohm's as a special case. In acoustics Ohm discovered that the ear of itself analyzes any complex sound into simple tones in the manner contemplated in Fourier's theorem, a fact which later proved of great importance in the hands of Helmholtz. In 1852 Ohm was appointed to the chair of physics at the University of Munich. His most important work is his theorem concerning the galvanic circuit. His collected works were published at Leipzig in 1892. He died at Munich on July 7, 1854.

Oil City, a town in Venango County, Pennsylvania, is situated on both sides of the Allegheny River, 133 miles northeast of Pittsburgh. It is in the oil-region, and is one of the largest oil-markets of the State. Its industries include chiefly oil-refineries, engine and boiler factories and large manufactories of barrels. Among its noteworthy buildings are the Oil-Exchange, the Standard Oil Company's office, Carnegie library and several churches. In 1892 the town was visited by an unusual catastrophe, being partially destroyed by a flood of burning oil from Titusville. Over $1,000,000 worth of property was destroyed. Oil City was settled in 1860, as a result of the discovery of petroleum on Oil Creek. The population in 1930 was 22,075.

Oil Wells. See PETROLEUM.

Oils, a term used to indicate a large class of compounds. The more common animal and vegetable oils, which are the fatty or fixed oils, are all compounds of glycerine with fatty acids. The term fats is usually given to the solid forms, and oils to the fluid. The solid fats, however, become fluid when heated. All these fats and oils are lighter than water and will not mix with it. They penetrate paper or cloth, making it partly transparent, and leaving what is known as a grease-spot. When pure and fresh they usually have little or no taste or smell; but, when exposed to the air, they become darker in color, have a disagreeable taste and smell, and are called rancid. As examples of vegetable oils we have cottonseed-oil, linseed-oil, olive-oil, almond-oil and cocoa-butter. Linseed is brought largely from Russia and India; Africa supplies palm-oil; India and the Pacific islands coconut oil; while the best olive-oil is brought from Italy. In animal oils the principal ones are butter, lard, tallow, neatsfoot-oil and sperm-oil. Tallow is the fat of oxen and sheep, melted and purified. Lard, obtained from the hog, is one of the great products of the United States, 60,000 tons yearly being sent to Great Britain alone. Neatsfoot-oil is produced by boiling the feet of cattle. Sperm-oil and other fish-oils are obtained from different varieties of fish and sea animals, as the whale, seal, cod, shark or herring. The uses of the different oils are very numerous. As food and in the preparation of food, in soap-making, painting, machinery and in a thousand other ways they are of great importance. There is a large class of substances known as the essential or volatile oils, which resemble the facts somewhat in their properties, particularly in not mixing with water. They make a grease-spot which is not permanent. These are quite varied in composition, are more or less volatile and have strong and characteristic odors. Oils of turpentine, lemon and wintergreen are examples of a great number of these products which are largely used as solvents, for flavoring, in perfumery and in medicine. The mineral oils are chiefly hydrocarbons, and belong mainly to the paraffin series. They are used as illuminants and lubricants.

Ojibways (*ō-jĭb'wās*) or **Chippewas** (*chĭp'ē-wäs*), a large tribe of North American Indians belonging to the Algonquin family and living around Lakes Huron and Superior. They usually were at war with the Sioux and Iroquois, driving the Sioux from the sources of the Mississippi. They joined the French, taking part in Pontiac's War; and in the Revolutionary War they fought with the British. They came as far east as Lake Erie, but gave up all their lands in Ohio in 1817. Their lands have gradually been ceded to the United States, and most of the tribe are on lands west of the Mississippi. Their history has been written by two members of their tribe. The Ojibways dispersed into Canada, where about 15,000 were settled, and in Kansas, Minnesota, Wisconsin, Michigan and North Dakota, where 18,000 in all have residence.

Oka (*ŏ-kȧ'*), a river in Central Russia, the principal branch of the Volga rises in the government of Orel, and flows northeast through the most fertile region of Russia, for 906 miles, to the Volga, which it joins at Nijni-Novgorod. It is navigable for part of the year only.

Okhotsk (*ō-kŏtsk'*), **Sea of,** an arm of the Pacific, is situated between Kamchatka and Eastern Siberia. It is 1,000 miles long and 600 miles broad, and contains several islands. It is seldom navigated.

Oklahoma (*ō-klȧ-hō'mȧ*), "the Boomer State," is in the west south central group of the United States. It is bounded on the north by Kansas; on the east by Arkansas and Missouri, and on the south and west by Texas. A small panhandle strip on the north and west is also bounded by Colorado and New Mexico. The name Oklahoma is from a Choctaw Indian word meaning "red people," signifying the first inhabitants of the State. The area of Oklahoma comprises 70,057 square miles, 643 square miles of which are water.

Surface and Drainage. The eastern portion of the State is mountainous. The Ozarks extend from Missouri into the northeastern section, rising to an elevation of about 500 feet, with picturesque mountains of limestone formation, into which the streams have cut narrow channels. Low, wooded mountain ranges extend down the entire eastern border, separated by oftentimes extensive stretches of plateau and forest land, and affording vistas of delightful scenery. Beyond this mountainous section the greater part of Oklahoma stretches westward in wide, rolling prairies, of fertile soil, rising to the High Plains. The entire region is steadily elevated toward the west and north where the surface is rough and broken, with marked effects of erosion in canyons, mesas and buttes. In the south central part of the State, the prairies are broken by the low sixty-mile range of the Arbuckle Mountains, which are but thirty miles in width, presenting a very picturesque change in the level landscape. The Wichita Mountains rise in the southwest, a rugged and straggling mountain mass, of granite formation, rising sharply from the plains. The southern border, which lies just within the Coastal Plain, has the lowest altitude in Oklahoma, while the highest point in the State is in the northwestern section where an elevation of 4,700 feet is reached.

The eastern soils are chiefly from the Ozark limestones or from shales and clays, with extensive alluvial bottoms along the Red River. They are well adapted to agriculture. The prairies abound in brown or red sandy loams from the Permian red beds underlying the top soil. The northern banks of the chief rivers are banded broadly by sand hills. The High Plains are of gravelly and sandy loams, or sand, with extensive alluvial river bottoms for many of the rivers. In the northwestern part of the State are several large salt plains. For the most part and especially in the east, the soil is fertile with a rich vegetable mould, but sections of the west and northwest have scanty rainfall, limiting the vegetation mainly to sagebrush and cactus. Oklahoma is drained by numerous rivers and streams, none of which are navigable. The drainage flows chiefly to the southeast except for the southern border, along which the Red River flows. Its tributaries on the Oklahoma side take a more southerly direction than the streams of the central and northern parts of the State. The principal rivers draining into the Red River are the North Fork and the Washita. The largest river of the north and the largest system in the State is the Arkansas, into which drains the Salt Fork, Verdigris, Grand and Illinois from the north, and the Cimarron, North Canadian and Canadian from the west and south.

Climate. The climate of Oklahoma is generally healthful, with a short mild winter and often extreme heat in the summer. The western and central parts of the State are cooler and drier than the eastern. At Oklahoma City the mean temperature is fifty-nine degrees, as compared to fifty-seven in the extreme northwest and sixty-two in the southeast. The mean annual precipitation varies from forty inches in the east, through the well-watered agricultural sections, to seventeen inches in the extreme west, where irrigation is extensive.

Minerals. Petroleum was discovered in Oklahoma in 1905. Since that time, the State has risen to first rank in the production of petroleum in the United States. Much of this oil land was owned by people of moderate circumstances. The Osage Indians, who numbered 3,547 in 1933, received in 1926 the sum of $22,000,000 when their oil wealth was at a peak. In 1932, the total petroleum production was 152,621,000 barrels. There were 263,685 cubic feet of natural gas produced in 1931, and 377,700,000 gallons of natural gasoline in 1932. Oklahoma produced 1,326,000 net tons of coal in 1932, and 14,952 short tons of lead. The State forms a large part of the Tri-State region, which produced 66,400 net tons of zinc in 1932. Other mineral resources include clays, gypsum, granite, building stone and mineral waters.

Production and Industry. Oklahoma is essentially an agricultural State. In 1931, there were 203,866 farms which comprised 33,790,817 acres. The State leads in the production of broom corn, which yielded 14,700 tons in 1932. Other important crops, with their 1932 productions, are corn, 65,760,000 bushels; winter wheat, 43,626,000 bushels; oats, 24,012,000 bushels; grain sorghums, 10,914,000 bushels, and cotton, 1,080,000 bales. Other agricultural products are hay, potatoes and fruits. Dry farming is extensively practised in the western section of Oklahoma, where 890 acres are irrigated. Stock-raising is an important industry. In 1933 there were 2,280,000 cattle in the State, of which 766,000 were milch cows, and 1,506,000 swine. There is considerable forest land, on which yellow pine predominates. The normal annual cut of this timber is about 200,000,000 feet, which leaves 4,800,000,000 feet standing. Other valuable trees are elm, cottonwood, ash, walnut, hickory, pecan, cedar, oak and tupelo. The national forests extend over 16,480 acres.

For many years, the manufactures of Oklahoma were chiefly agricultural, but the discovery of petroleum greatly enlarged the field, and afforded a cheap fuel for industrial development. In 1929, 1,657 manufacturing establishments were reported with 31,279 employés who produced goods valued at $452,161,249. The leading industry is petroleum refining. Zinc, smelting and refining is also important, as are the flour mills, and the cottonseed products factories. Other important industries include lumber and timber mills, printing and publishing establishments, railway shop construction, foundry and machine shop products, dairy products, brick and tile, slaughtering and meat-packing.

Transportation. Although Oklahoma has no waterways for transportation, the rail and highway facilities have been extensively developed. In 1932, Oklahoma had 6,778 miles of steam railways and 217 miles of electric railways. There were also 6,897 miles of highway, 2,613 miles of which were State-maintained.

Population. The population of Oklahoma in 1930 was 2,396,040, an increase of 18.1 per cent since 1920. In that same year on Indian reservations, occupying an area of sixty square miles, there was a population of 92,725, including the Five Civilized Tribes of which the country was once the home—Cherokees, Creeks, Choctaws, Chickasaws and Seminoles. Of the total population, 1.1 per cent were foreign-born whites, 7.2 per cent were Negro, and 34.3 per cent were urban. The chief cities, with their 1930 populations, are: Oklahoma City, the capital, 185,389; Tulsa, 141,258; Muskogee, 32,026; Enid, 26,399; Shawnee, 23,283; Okmulgee, 17,097; Seminole, 16,159; Ponca City, 16,136; Ardmore, 15,641, and Bartlesville, 14,763.

Education. In 1930 the rate of illiteracy was 2.8 per cent in the State, of which 1.7 per cent was among native whites, 5.6 per cent among foreign-born whites, and 9.3 per cent among Negroes. There are separate schools maintained for Negroes. In 1931 there were 4,867 public elementary schools with an enrollment of 684,968 and 19,656 teachers, and 850 public high schools with an enrollment of 108,755 and 5,144 teachers. The most important institution of higher learning is the State University founded at Norman in 1892, which had in 1932-33 an enrollment of 7,052 and a faculty of 308. Other institutions of higher learning include the Agricultural and Mechanical College; Kingfisher College; the Agricultural and Normal University for colored students, and the Indian School at Chilocco.

Government. Oklahoma has made provision in its Constitution for the initiative and the referendum in such a way that eight per cent of the legal voters have the right to propose any legislative measure, and fifteen per cent have the right to propose amendments to the Constitution by petition. The Legislature comprises a Senate of forty-four members who are elected for four years, and a House of Representatives elected for two years and consisting of not less than 115 nor more than 120 members. In 1932-33 there were 118 Representatives in this legislative body. No Indians can qualify as voters except those who have severed tribal relations. The State is represented in the National Congress by two Senators and nine Representatives.

History. The entire territory of Oklahoma except for that which was long known as the Public Land Strip, now part of Beaver County, was included in the Louisiana Purchase of 1803. The Public Land Strip was ceded to the United States by Texas in 1850 and added to Oklahoma in 1890. The country comprised in this State was set aside in 1834 as Indian Territory, especially for the Five Civilized Tribes, which were granted large tracts between 1825 and 1850. During the Civil War, the Indians were divided in allegiance, but in 1865, by treaty with the United States, they freed their negro slaves. In 1866 and 1889 the Cherokees, Creeks and Seminoles sold most of their holdings, amounting to more than 2,000,000 acres, to the United States Government for an average of fifteen cents an acre. White settlers had been forbidden on these lands by treaty with the Indians. In spite of this provision, there were repeated attempts at settlement by force. In 1879 an organized effort at such settlement resulted in the ejection of the invaders by United States troops. Daniel L. Payne, the leader, continued until his death in 1884, to organize groups and attempt settlement. He helped to earn for Oklahoma its title of the "Boomer" State, as his adventurers were termed "boomers." After his death, his followers continued evasion even more determinedly, although the Federal Government upheld the integrity of the Indian treaties and enforced them with military aid. In 1885 negotiations were begun with the Creeks and Seminoles, looking to white settlement. On April 22, 1889, these lands were opened to home-seekers in one of the most spectacular races history has ever known. Prospective settlers gathered along the border, with wagons, on horseback, even on foot, and at the noon signal raced for farm sites and town lots. In the same year the lands of the Sacs, Foxes, Pottawatamie, Cheyenne and Arapahoes were opened to settlement. In 1893 the Cherokee strip was opened; in 1895 lands from the Kickapoos, and in 1901 the Kiowa, Comanche, Apache and Wichita lands, with additions in 1906. In 1890 Oklahoma Territory had been separated from the Indian Territory and two years later began the agitation for statehood. In July, 1905, a joint statehood convention was held at Oklahoma City, and the next Congress passed a Joint Statehood Bill for the admission of Indian and Oklahoma Territories as one State, with the capital at Guthrie. The State Constitution was ratified on September 17, 1907, and the State admitted to the Union on November 16. The capital was moved to Oklahoma City in 1910.

Oklahoma City, the capital of the State of Oklahoma, its largest city and the seat of Oklahoma County, is situated on the North Fork of the Canadian River, near the center of the State, thirty-three miles south of Guthrie and 210 miles north of Fort Worth, Texas. It is served by a number of railroads, including five trunk lines. Oklahoma City has a number of beautiful buildings, among which are the Carnegie Library, St. Anthony's Hospital, the Sacred Heart Abbey and the Masonic Temple. The Capitol Building is the finest structure in the city. The founders of the city planned for the future, so that there has been no crowding. A boulevard twenty-six miles long encircles the city. The park system comprises 1,400 acres and has been beautifully developed. The city is the seat of Epworth University, Oklahoma City College, Sisters of Mercy College and Oklahoma Military Institute. The city is in the center of a region that is noted for oil, agriculture and stock-raising, and it is also on the main trade routes from north to south and from west to east. Consequently its commercial interests are extensive. Water power is derived from the rapids of the Canadian River. Important items of trade are cotton, refined petroleum, grain, livestock and fruit. There are two large meat-packing plants, extensive flour and grist mills, oil refineries, cottonseed oil and cake mills, cotton gins and compresses, machine shops, foundries, cracker and soap factories, egg and poultry-packing plants and printing and publishing houses. Oklahoma City has had an almost phenomenal growth. It dates its existence from the opening of the Indian Territory for settlement in 1889, in which year it was founded. The discovery of petroleum greatly augmented the growth of the city, as it is centrally located in the rich oil district. In 1900 there was a population of 10,037, which increased to 64,205 in 1910. In the following year, Oklahoma City was made the capital of the State, and in May of that year it adopted the commission form of government. In 1920 the population had grown to 91,295, and in 1930, it was 185,389.

Old Curiosity Shop, a novel by Charles Dickens, was published in 1840. The story centers around Little Nell, the grandchild of the keeper of the shop and her weary quest for a safe retreat for her grandfather and herself. The grandfather, in an eager desire to secure a fortune for his grandchild, became addicted to gambling. Losing all his property and still crazed with the gambler's hope of winning, he borrowed from Daniel Quilp, a malignant old dwarf and thus came into his power. Little Nell, realized his position, took him and a few personal belongings and secretly stole away. With this double burden she entered upon a wandering life which ended only with death.

Oldham (*ōld'ăm*), a manufacturing city in Lancashire, England, is situated seven miles from Manchester and thirty-eight miles from Liverpool. It was a small village in 1760, its growth being due to its nearness to the Lancashire coal-fields and to its cotton manufactures. It has over 300 mills, and uses one fifth of all the cotton imported. Oldham produces hats, velvets, velveteens, sateens, nankeens, sheetings, and cord. There are weaving-machine works, one of which employs 7,000 hands. There are public buildings, including a town hall of Grecian architecture, a lyceum, school of science and arts, and a fine park. The population in 1931 was 140,309.

Old Point Comfort or **Fortress Monroe,** a government military reservation, is situated in Elizabeth City County, Virginia, at the mouth of the James River and the entrance of Hampton Roads and Chesapeake Bay. It is an important coast defense. Its garrison comprises ten companies of coast artillery. The artillery school for officers, that of the submarine coast defense for officers and the master-gunners' school are located here. Its large accommodating hotel faces Hampton Roads. It was destroyed in 1862, as it was in the way of the batteries on Fortress Monroe, but has been rebuilt and is very popular. The watering-place is 16 miles north of Norfolk, Va.

Old South Church or **Old South Meeting-House,** Boston, stands at the corner of Milk and Washington Streets. It occupies the site of an original wooden church; but even the present building dates back to 1729. In this church many events of historic interest have occurred. Here Judge Sewall confessed and repented his part in the witchcraft agitations which marked 1692; Benjamin Franklin was baptized; revolutionary meetings were held; and the expedition to throw the taxed tea overboard in 1773 was assembled. Old South Meeting-House was used as a riding-school in 1775, and as a post-office after the fire of 1872; but it now is in the hands of a patriotic society and houses a collection of interesting historical relics.

O'lean'der, species of *Nerium*, a genus belonging to the dogbane family. There are but few species, which are natives from the Mediterranean region through southern Asia to Japan. The common oleander of cultivation is *N. oleander*, native to the Mediterranean region; while *N. odorum*, a sweet-scented form, comes from the East Indies. The plant is said to be more or less poisonous, especially the leaves. *N. oleander* rises to a height of eight or ten feet; the leaves are thick and leathery, evergreen; the plant blooms profusely, bearing a myriad of white or pink blossoms. In warm countries it is a favorite shrub, in cooler lands a favorite house-plant. It may readily be propagated by planting cuttings previously started in bottles of water.

O'le Bull. See Bull, Ole.

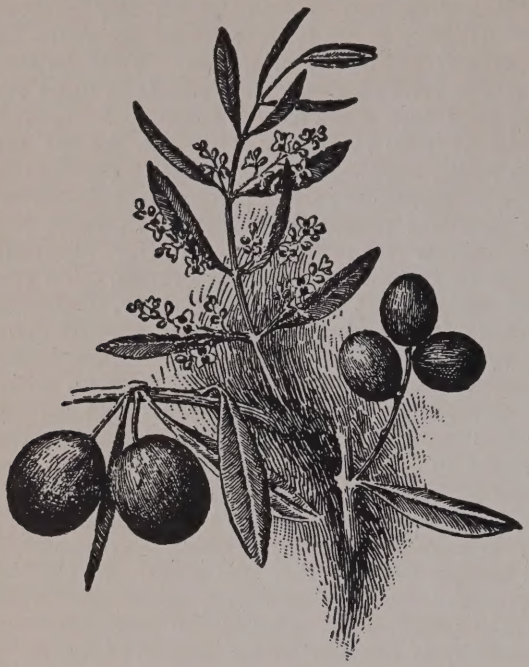
O'lean', N. Y., a city in Cattaraugus County at the confluence of the Allegheny River and Olean Creek; on the Erie; Pennsylvania; and Pittsburg Shawmut and Northern railroads, about 68 miles southeast of Buffalo. It is a distributing point for large quantities of petroleum, through a pipeline system, and has manufacturing industries of importance. It has good schools, public and private; Foreman library; and about 20 church edifices. It was settled in 1804, incorporated as a village in 1854 and chartered as a city in 1893. The government is vested in a mayor, elected for two years, and a council. The city owns and operates its own water works. Population 26,000.

O'leomar'garine, a substance made from tallow, resembling butter. It is also called butterine. The making of artificial butter was first suggested by a French chemist, and is quite an important industry. American factories produce large quantities, which are used in this country mostly for cooking purposes, but, shipped to Europe, take the place of butter among the poorer classes. Beef-suet is washed several times in lukewarm water, minced fine in a cutting machine, and melted by steam, when salt is added. The fat floats on top and is drawn off, purified, and, after it is cold, pressed to separate the butter-oil from the stearine. This butter-oil is the true oleomargarine. It is light yellow, and has a pleasant taste. A mixture made of two thirds of this oil, about one fifth milk, with a small amount of butter and some coloring matter, is churned together, the product resembling butter in taste and appearance and having all the elements found in butter made from cream. To prevent sale of it as cream-butter, Congress passed a law taxing the sale and requiring every package to be marked as oleomargarine or butterine. Annually the amount on which the government tax is paid exceeds 53,000,000 pounds weight. The value of the annual product in the United States amounts to over $10,000,000. In England the sale of margarine has grown largely of recent years; butter and margarine are now being consumed to the extent of 13.9 lbs. per head. Margarine is growing steadily in favor, since good margarine, which is a wholesome and excellent foodstuff, is always to be preferred to indifferent butter.

Ol'ga, St., a Russian princess and saint of the Greek church. She governed the country during the minority of her son. Going to Constantinople, she was baptized, taking the name of Helena, and labored with great zeal to spread her new faith throughout Russia. She died in 969, and is highly venerated by the Russian church. Her festival occurs on July 21.

Ol'iphant, Mrs. Margaret (Wilson), a Scottish novelist and writer, was born in Midlothian in 1828. Her first book, *Passages in the Life of Mrs. Margaret Maitland*, appeared in 1849, and at once attracted attention. Other works followed, some of them appearing in *Blackwood's Magazine*. Her reputation as a novelist was, however, first made by the publication of *The Chronicles of Carlingford*. She was a prolific writer, having written over 30 novels and 10 or 12 other works. Among her works are *The Makers of Florence; The Makers of Venice; The Makers of Modern Rome; Royal Edinburgh; Francis of Assissi; Historical Sketches of the Reign of George II; Memoirs of the Count de Montalembert;* and *Literary History of England from 1790 to 1825*. She died at London, June 25, 1897.

Ol'ive, species of *Olea*, a genus containing over 30 species, natives of the tropical and subtropical regions of the eastern hemisphere. The common commercial species are under cultivation for the well-known fruit. The olive has been cultivated from the earliest times, chiefly for the sake of the oil, which is obtained from the fruit by pressure, and is extensively used for pickles. The tree has been grown in California since the old mission-days, and is raised extensively in that state. It occasionally grows to a height of 40 feet, the grayish-green leaves being green always, and the fruit varies in color. The oil has a high food-value.

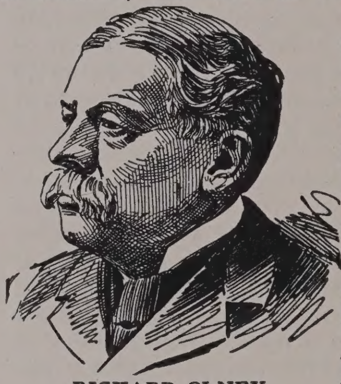

OLIVES

Ol'iver Twist, a favorite novel by Charles Dickens which takes its title from the hero of the story, was first published in *Bentley's Miscellany* in serial form during 1837–9. Oliver Twist had been brought up in a workhouse of the worst type, and only escaped from his subsequent apprenticeship to an undertaker to fall into the clutches of Fagin the Jew and his gang of pickpockets. But through all temptations and sordid influences of environment Oliver remained simple, pure and uncontaminated. *Oliver Twist* has far more of plot and tragic power than the *Pickwick Papers* which preceded it. Its pathos is even greater than its humor.

Olives, Mount of, also called Mount Olivet, lies east of Jerusalem, separated from it by the narrow Valley of Jehoshaphat. Its name came from a beautiful grove of olive-trees, which formerly grew on its western slope, but has now almost disappeared. The brook called Kedron flows through the valley, and by the bridge crossing it is the Garden of Gethsemane. The mount is divided into three summits, the highest 361 feet above Jerusalem and 2,725 above the sea, and on the central summit is the village of Olivet. The northern peak is supposed to be the place where the angels appeared to the disciples after the resurrection of Christ, and was the site of the Roman encampment at the destruction of Jerusalem. The central peak is pointed out as the mount from which Christ ascended after his resurrection, the place where he had wept over Jerusalem and had taught his disciples the Lord's Prayer. St. Helena built a church there, the site of which is now occupied by a later one, called the Church of the Ascension, and near it is a Mohammedan mosque.

Olm'sted, Frederick Law, an American landscape-gardener, was born at Hartford, Conn., April 26, 1822. He studied engineering at Yale, and followed farming and gardening for a few years. Becoming interested in landscape-gardening, he traveled on foot through England in 1850 and in 1855 through France, Italy and Germany, to study parks and ornamental grounds. He published *Walks and Talks of a Farmer in England, A Journey in the Slave States, A Journey Through Texas* and *A Journey in the Back Country,* after a tour through the south and west. He is best known as the superintendent, with Mr. Vaux, of the laying out of Central Park, New York, and of the grounds around the capitol at Washington. He has also designed parks and public works at Chicago, Buffalo, Brooklyn, Boston, Milwaukee and Montreal, and acted as commissioner of Yosemite Park. He planned the laying out of Jackson Park, Chicago, for the Columbian Exposition. He was appointed by Lincoln on the commission to inquire into the sanitary condition of the United States army, serving three years (1861-63). He died on Aug. 28, 1903.

Ol'ney, Richard, an American jurist and statesman, was born at Oxford, Mass., Sept. 15, 1835. He graduated from Brown University in 1856, and afterward spent three years in the Harvard Law School. When admitted to the bar he began the practice of law at Boston and rapidly rose to fame. He took no active part in politics until, during the administration of President Cleveland, he was called to a place in his cabinet as attorney-general, afterward as secretary of state. On the return of the Republicans to power he resumed the practice of law at Boston, having won distinction in the settlement of various important matters of state upon which he was called to act during his career in the cabinet. He died in 1917.


RICHARD OLNEY

Olym'pia, Wash., capital of the state and county-seat of Thurston County, is on a peninsular at the southern end of Puget Sound, 65 miles from the Pacific. The Deschutes, which enters Puget Sound here, has a fall of 85 feet in 300 yards, which gives abundant water-power. A bridge, 2,030 feet long, formerly crossed the end of the sound. The Coast Mountains on the left and the Cascade Mountains on the right, with the sound in front, make fine scenery. There are flour mills, sawmills and shoe and soap factories, salmon canneries, machine shops etc. It has public and parochial schools, besides St. Amable Academy (R. C.), St. Peter's Hospital (R. C.) and the state library which contains 30,000 volumes. Population 6,782.

Olym'pic Games, the most famous and splendid national festival of the Greeks, celebrated once in five years in honor of Zeus, on the plain of Olympia. Olympia was a beautiful valley near the river Alpheus, and contained temples, monuments, altars and statues, connected with Greek art and religion. There were about 3,000 statues at the time of the elder Pliny (23–70 A. D.). The sacred grove was a level space, nearly square, being 600 feet long and about 580 feet broad. It looked toward the Ionian Sea, with the rivers Alpheus and Cladeus on its southern and western boundaries. It was well-wooded and crossed by a road called the Pompic Way, the route taken by all the processions. The games date back of 776 B. C., but in that year became a national festival, and the custom of reckoning time by Olympiads began. The contests were at first permitted only among the Greeks, but after the Romans conquered Greece they took part in the games, Tiberius and Nero appearing in the list of victors. Women were not allowed to be present, with the exception of the priestess of Demeter. The games were held at the first full moon of the summer solstice, about the last of June. While the games were in progress, all hostilities were stopped by proclamation of heralds through the country. The contestants went through 10 months' training in the gymnasium at Elis, and the judges, at first two but later 12, were instructed as long in their duties. The judges held office only one year. The contests were foot-races, wrestling, boxing, leaping, running and throwing the spear and the discus or quoits, with chariot and horse races. On the fifth day there were processions, sacrifices and banquets to the victors. The victors, each holding a palm-branch, were presented to the people, and while heralds proclaimed their names and their parents', they were crowned with garlands of wild olive twigs, cut from a sacred tree of the grove. Statues were erected to them; they had the place of honor on public occasions; were usually exempt from paying taxes; and at Athens were boarded at the expense of the state. Songs were sung in their praise, as 14 of Pindar's lyrics bear witness. The games were abolished by Emperor Theodosius in 394 A. D.

Olym'pus, Mount, a group of mountains in Turkey between Thessaly and Macedonia. The eastern side fronts the sea, and has deep precipices and ravines filled with forest trees. The highest peak is 9,790 feet high. In Greek mythology it was the residence of Zeus, whose palace was thought to stand on its summit.

O'maha, Neb., the largest city in Nebraska and county seat of Douglas County, is the gateway to the richest agricultural territory in the world. Located on the Missouri River, the city is built on a plane about eighty feet above the river, from which the elevation gradually rises. Omaha is the third primary livestock and slaughtering center in the world, the fourth primary grain market of the world, the first feeder sheep market of the world, the greatest creamery butter producing city in the world, the second primary corn market of the United States, and has the second largest refinery of fine ores in the United States. Though it is the 33rd city in the United States, in population, Omaha is the 16th city in volume of business. The clearings of its banks total nearly $1,000,000,000 annually and its manufacturing interests amount to $190,000,000 annually. Its wholesale business aggregates $160,000,000. It is an important railroad center, nine trunk lines converging there. The city has had a wonderful growth and has numerous fine buildings, many of which are skyscrapers. Omaha has 49 public school buildings, 2 high school buildings, 2 universities—Creighton and Omaha, 7 intermediate schools, 10 parochial grade schools, 19 parks, connected by 29 miles of boulevards, 14 hospitals, including St. Joseph's which is the largest west of Chicago, a fine art gallery and 3 daily newspapers. Omaha is governed by a commission of seven members and was one of the first large cities in the country to adopt this form of government. It is the headquarters for the Fourth United States infantry and also for the United States signal corps. South Omaha and Dundee, two thriving suburbs, have been consolidated with Omaha. Total population, 200,000.

Omahas, a tribe of American Indians, of the Dakotah family, settled in northern Nebraska. They were found by Marquette (1673), by Carver (1766) and by Lewis and Clark (1805). They were constantly at war with the Sioux, but since 1855 have been at peace and have improved rapidly. They cultivate the ground, and have churches and schools. Their present number does not exceed 1,200.

O'mar I, Abu Hafsah Ibn ul Khattab, the second caliph of the Mussulmans, was born about 581 A. D. Although he was at first bitterly opposed to Mohammed, he suddenly gave his adherence to the cause of the prophet and became a chief supporter of his creed and claims. He succeeded Abu-bekir in 634 A. D. He declined the title of Caliph or successor, as too exalted; and chose rather to be called Emir or Commander. It was through his command the Hejira (Flight) was adopted as the point from which the followers of Mohammed should date their years. It was by his genius that the Arabian empire was founded. Under his irresistible advance Syria and Palestine were conquered, and he built the Mosque of Omar which still stands central in Jerusalem. He subdued Egypt and Persia, and brought for the first time all the Arabian tribes under one creed and authority. An act of injustice, not usual with him, it should be said, incurred the resentment of a Persian slave, and he was assassinated in 644. He was buried near Mohammed.

Omar Khayyam (*khī-yäm'*), a Persian poet and astronomer, was born at Nishapur about the middle of the 11th century. Khayyam is his poetical name, and was taken from his father's business as a tent-maker. He was educated under one of the great Persian teachers and offered a place at court, but refused and was given a pension instead. He reconstructed the calendar, making it, as Gibbon says, "very much superior to the Julian, approaching in accuracy to the Gregorian style." He wrote mathematical treatises in Arabic, one on algebra, which has been translated into French. He was better known as an astronomer than as a poet until 1859, when Edward Fitzgerald, published a translation of his *Rubáiyát* or quatrains, which gave him a place among the true poets, though the translation is deemed much finer than the original. His astronomical work brought on him the suspicion of heresy, which his poem did not remove, and to allay the feeling against him he made a pilgrimage to Mecca. He died at Nishapur in 1122. See *Letters and Literary Remains of Fitzgerald*, Vol. III.; *Rubáiyát.*

O'Mea'ra, The Reverend Thomas Robert, LL.D., principal of Wycliffe College, Toronto, and canon of St. Alban's cathedral, was born at Georgetown, Ontario, Oct. 16th, 1864. He was educated at the public school and the collegiate institute at Port Hope, from which he went to the University of Toronto and Wycliffe College, graduating in 1887. He was ordained a deacon in July of 1887 and a priest in December of 1888. For a year he was curate of St. Philip's, Toronto, but in 1889 he accepted the assistant-rectorship of Trinity Church, Toronto, and the financial secretaryship of Wycliffe College. Principal O'Meara held this position until 1903, when he accepted the chair of practical theology which he still holds. In 1904 he was appointed rector ot Trinity Church, Toronto. In 1906 he resigned to accept the principalship of Wycliffe College. Principal O'Meara has for many years been secretary of the Canadian Church Missionary Society, of which he was elected a life governor three years ago. He has also been president of the Church of England Deaconess and Missionary Training-House for years. He also is vice-president of the Upper Canada Bible-Society.

Om'nibus Bill, The, a term applied to a bill reported on April 17th, 1850, by a committee of the Federal Senate of the United States headed by Henry Clay, because of its all-comprehensive nature. The bill consisted of thirty-nine sections, and provided for the admission of California with her free constitution, territorial government in New Mexico and Utah, without express restriction upon slavery; a territorial boundary line between Texas and New Mexico in favor of the former; a more efficient fugitive slave-law; and denial to Congress of power to interfere with slave-trade between slave-states. After long discussion the bill was broken up and each measure covered by a separate bill. The term is now commonly applied to all single legislative acts in which are incorporated a number of loosely connected or wholly disconnected measures. Such bills used to be passed by state legislatures with considerable frequency, but in later years provisions have found their way into constitutions requiring that single statutes shall deal with but one main subject which shall be clearly indicated in the title.

One'ga, Lake, in the north of Russia, northeast of Lake Ladoga and, after it, the largest in Europe. It is 146 miles long and 50 wide, covering 3,764 square miles. It has but one outlet, the Svir, flowing into Lake Ladoga. There are numerous islands and bays and abundance of fish. It is closed by ice for 156 days in the year, but has a large traffic on its waters at other times. A ship-canal, 145 miles long, to connect it with the White Sea, is planned, the surveys being finished in 1890.

Oneida, Madison County, New York, population 6,083, on the N. Y. C. & H. R., N. Y. O. & W., and West Shore Railways, and the Barge Canal, gets its name from the Oneida Indians who formerly made this locality the seat of their councils. It is also their headquarters of the religious organization known as the "Oneida Community," the members of which follow the practice of the early Christians of holding everything in common and contrary to the experience of most communistic enterprises, have been very successful in their industries, which are located at Oneida.

Onei'da Lake, one of the numerous lakes of central New York. It is 23 miles long and about 5 wide, and flows through the Oneida into Oswego River. It lies 11 miles northeast of Syracuse.

On'ion, a plant with a bulbous root, belongs to the lily family. It has been cultivated from the most ancient times, but its origin is unknown. It may have come from northeastern Africa or western Asia, for it is mentioned in the writings of the ancient Egyptians. American white onions are mild and popular. Bermuda and Spanish onions are now extensively cultivated in the warmer parts of the United States as a winter crop. The potato-onion is a strongly flavored species, almost like garlic, and perennial. Onions are sometimes attacked by such insects as onion-maggots and onion-cutworms. Kerosene, ground-up tobacco-stems and nitrate of soda are used to overcome these pests, but it is well to root up the wilted plants and to rotate onions with other crops.

Onta'rio, Can., the wealthiest and most prosperous province of British America, is a triangle between St. Lawrence and Ottawa Rivers whose western base rests on Lake Huron. Its extreme length is 1,400 miles, its breadth 900 and its area 407,262 square miles since extension of 1912. Ontario is larger than either France or Germany and over twice the size of the United Kingdom. It is bounded on the north by Manitoba and Quebec; on the east by Quebec and New York, from which it is separated by the St. Lawrence, Lake Ontario and Niagara River; on the south by Lake Erie; and on the west by Detroit River, Lake St. Clair, St. Clair River and Lakes Huron and Superior, while Minnesota impinges on Ontario from Lake Superior to Manitoba.

The population of Ontario at the present time is 2,523,274, and of the total inhabitants eighty-seven per cent, or 1,858,787 are natives of the province. Of those born out of the province the most numerous are natives of the United Kingdom. The province contains about two-fifths of the entire population of the Dominion, and, in contrast with Quebec, is an English and Protestant province. Methodists in Ontario number 666,388; the Presbyterians, 477,386; the Roman Catholics (chiefly French), 390,304; the Church of England, 367,937; and the Baptists, 116,320. There also are 32,600 Dunkards and Mennonites. Toronto (*q. v.*) is the provincial capital. Other important towns are Ottawa (*q. v.*), the capital of the Dominion; Hamilton; London; Kingston; Brantford; Guelph; and St. Catharine's. (See article under these names.)

Surface and Drainage. Distinctive features are the Great Lakes, the St. Lawrence and Hudson Bay. The surface is an undulating plateau without considerable elevations. The Laurentian Hills, 1,200 feet high at most, run westward from the St. Lawrence near Kingston to north of Lake Simcoe and form the watershed that separates the streams flowing into the great Lakes from those entering Hudson Bay and from Ottawa River and the St. Lawrence. The chief rivers are the St. Lawrence and the Ottawa, with the Albany that enters Hudson Bay and the Niagara between Lakes Erie and Ontario. Besides the Great Lakes, which lie partly in the United States (Michigan wholly), Ontario's lakes include Nipissing, Nipigon, Simcoe, Rideau, Muskoka and (western boundary) the Lake of the Woods. The Thousand Islands of the St. Lawrence, its rapids, Niagara Falls and the myriad islands of Georgian Bay are world-famous scenic features of Ontario. The northern coast of Lake Superior also is remarkable for beauty.

Natural Resources. Ontario has five leading sources of wealth: agriculture, mining, fisheries, forests and manufactures. About half of the province is covered with timber, chiefly pine, spruce, tamarack, oak and hickory. These and the waterways, both natural and artificial, make lumbering one of the most important of all its great industrial interests. The quantity of white pine, it is claimed, exceeds that on any other area in North America. The Canadian spruce, the great pulpwood tree, is superior to the European variety. Fur-bearing animals, as the beaver, occur in considerable numbers in northern Ontario, where caribou, moose and other large game abound. Fisheries are important, the annual catch of whitefish, trout, pickerel, herring, etc., being valued considerably in excess of $2,000,000. The province is rich in minerals, as antimony, arsenic, copper, iron, lead and plumbago. Bounties are paid on the production of iron. Building-stone, gypsum and marble abound. Gold and silver exist, the latter very extensively along Lake Superior. The silver of Cobalt (*q. v.*) has attracted world-wide attention. The nickel deposits of Sudbury (*q. v.*) are the greatest in the world. The iron and the copper deposits are extensive. West of Lake Superior lies a gold region that is considered promising. The province is rich in salt wells, petroleum and natural gas. It has set 10,000,000 acres of forest aside as reserves.

Climate. Ontario's climate is said to resemble that of central Europe. It inclines to the extremes of cold in winter and heat in summer, but the dry air makes a bracing climate. Extreme cold is experienced only in the north, the Great Lakes in the south modifying the extremes of temperature.

Agriculture. In the south soils of black loam are of excellent quality and highly productive. Eastern Ontario, having the best land, is the garden of the province. The peninsula between Ottawa River and Lakes Ontario, Erie and Huron is the richest, most densely peopled and most productive part of Ontario. Northern or New Ontario covering 141,000 square miles or 100,000,000 acres, was until twenty years ago left to the trapper, the lumberman and the miner. Recently it has been found to have thousands of acres as fertile as any farms in old Ontario. This new district is north of the Canadian Pacific and of the Height of Land. It is in the vicinity of Lake Nipissing. Beyond it lies the great clay-belt extending from Lake Temiskaming almost across the province to James Bay and Albany River. It contains 15,680,000 acres of tillable land, is well-watered, and has forests of vast commercial value. The climate favors agriculture, for, though O tario's winter is severest at the Height of Land, the cold diminishes as more northern latitudes are approached—as far as James Bay. Ten thousand immigrants a year—farmers, lumberers, miners—have for so many years been streaming into northern Ontario that it now has within its borders 2,500,000 inhabitants. It has approximately 300 cities, towns and villages, including Ottawa, the Capital of the Dominion. It is now traversed and developed by the Grand Trunk Pacific (*q. v.*), a new road. Other fertile sections are Rainy River Valley, the Temiskaming district and Wabigoon Valley. The crops of Ontario, the old as well as the new regions, are wheat, barley, oats, Indian corn, potatoes and some tobacco. Niagara Peninsula is a vast fruit-farm, apples, grapes, peaches, pears and plums abounding, and grape-growing succeeds exceptionally well along Lake Erie. Stock-raising, dairy-farming and bee-culture are comparatively recent industries. Over a billion dollars have been invested in agriculture, the farmers number 235,000 and their annual return exceeds $200,000,000.

Commerce, Manufactures and Transportation. Numerous manufactures exist, chiefly due to the abundant water-power. The falls of the Ottawa and the rapids of the St. Lawrence are the chief sources of power, and the works at Decen and Niagara Falls (*q. v.*) give Ontario the most extensive water-power works in the world. The power-plants at Niagara and at Decen can cheaply supply all power required by every place within 100 miles of each. The principal manufactures are lumber and its by-products, agricultural implements, iron and woodware, wagons, carriages, locomotives, railway cars, cottons, woolens, leather, furniture, flax, hardware, paper and soap. Her industrial growth has been greatly stimulated by the agricultural development of provinces further west. Ontario has a network of railways, which in summer are supplemented by the Great Lakes, the St. Lawrence and the system of canals. The Sault Ste. Marie and the Welland are Ontario's principal canals, the former and the American one in seven months carrying three times the tonnage of Suez Canal, and the latter connecting Lakes Erie and Ontario, while the St. Lawrence connects Ontario with Europe as the Great Lakes link it to Duluth and Chicago. These waterways provide cheap transportation and economical distribution. The railways still more facilitate distribution. The Grand Trunk and the Canadian Pacific traverse Ontario, linking it to all Atlantic seaports of eastern North America and to Chicago, Minneapolis, Winnipeg and Victoria, B. C. A strong feature of her industrial life is that almost her entire output is sold in the Dominion. America and Britain share the bulk of Ontario's external trade, and its chief import is coal. It has a large number of sound and successfully managed banking institutions, a factor so important in her permanent growth and prosperity.

Education. The school system seems admirably adapted to Ontario's educational requirements. The public schools are free. (It is optional with the trustees of high schools to impose fees.) Their teachers receive professional training in country model schools and provincial normal schools. Toronto, Ottawa and London Normal Schools have long rendered service, model schools for observation purposes being attached to them, and four more are ready for work. A faculty of education has recently been established in the University of Toronto, taking the place of the normal school. The university has appointed a professor of education, and will study the schools of the city. In places without high schools their work is performed by continuation classes. The Roman Catholic schools are supported by their patrons but also share, pro rata, in grants made by the government for school purposes. The Kindergarten system is widely established in city schools. Less than 9% of her inhabitants over five years old are illiterate and the homes have the best books and periodicals. Among the institutions for higher education are McMaster, Ottawa, Queens, Toronto, Trinity and Victoria Universities; Knox, Ridley, Royal, St. Michael, Upper Canada and Wycliffe Colleges. There are colleges at Sandwich and Woodstock; women's colleges at Brantford, Hamilton, London, Oshawa, St. Thomas and Whitby. There is also an agricultural college at Guelph. There also are schools for Indian children, schools of art and many free libraries under the care of the board of education. A minister of education, who always is a member of the provincial cabinet, controls the whole system.

Government and History. Government is administered by a lieutenant-governor appointed by the Canadian governor-general for five years and assisted by a responsible ministry. There is a legislative assembly, of one house only, elected by ballot for four years. Steam and electric railways are under provincial regulation to some extent. Ontario enjoys the distinction of having a municipal system on which have been modeled the systems of the other provinces. It is more like the English city systems than those of American cities. Many cities are beginning to own and operate their own electric light and power plants. Ontario was explored by Champlain in 1615, hunted over by the French and visited by missionaries to its Indians. In 1763 Ontario passed from France to England, which in 1774 organized Quebec province, and in 1791 made Ontario Upper Canada or Canada West. In 1783 Ontario then mainly a forest wilderness, received the Americans who preferred allegiance to Great Britain instead of the United States, and its actual career began. In 1841 it was united with Quebec, but was separated again when the Dominion was formed in 1867. It played an active part in the Anglo-American War of 1812. It developed responsible government and English institutions. It rose in 1837, not against England, but against colonial grievances. It suffered from Fenian outrages in 1866. It prospered greatly during 1854-66. It has grown phenomenally in recent years. Its municipal governments closely approach civic perfection.

Ontario Agricultural College, Guelph, Can., was established in 1874. Its experimental farm has nearly 1000 acres. Dr. James Mills became president in 1879 and continued such until 1904, being succeeded by George C. Creelman. The primary aim is to train young men for practical farming. There are special laboratories for chemistry, biology and physics. The library building cost $45,000. Sir William C. Macdonald of Montreal for instruction in home-science has erected buildings at a cost of $175,000 and presented them to the province. There are 23 teachers. The students each year average over 700. The college, beside graduating practical farmers, has sent many to teach in other colleges. It is admittedly one of the best equipped and most successful colleges of the kind in the world. As regards advanced examinations it is affiliated with the University of Toronto.

Ontario, Lake, one of the five Great Lakes of North America. It lies between Ontario and New York state, and has an elevation of 250 feet above the sea. It is the smallest of the group, covering 7,240 square miles and being 190 miles long and 55 wide. It forms the connection between Niagara River and the St. Lawrence. The level of its waters varies about three and a half feet at regular periods of from four to seven years, which, it is thought, may be due to an underground river. Welland Canal connects it with Lake Erie, Oswego Canal with Erie Canal and Hudson River, and Rideau Canal with Ottawa. It is subject to storms, the agitation of its waters by which may account for its seldom freezing, except along the shore.

O'nyx. See MARBLE.

Oögonium (*ō'ō-gō'nĭ-ŭm*) (in plants), the female organ in thallophytes. It consists usually of a single cell, which produces a solitary egg, the oösphere. It may be a special cell set apart for this purpose from its beginning; or it may be an ordinary nutritive cell, which later becomes modified into an egg-producing cell. See THALLOPHYTES.

Oösphere (*ō'ō-sfēr*), the general name for the female cell or egg in plants. See EGG.

O'ospore (in plants), the general name for the spore which results from the fertilization of an egg by a sperm. The oospore is sometimes called a fertilized egg, and in plants which have a distinct alternation of generations the oöspore in germination always produces the sporophyte.

O'pal is a mineral, something like quartz, composed mainly of silica and water. It is never found in crystals, and is very easily broken. There are many kinds, so nearly resembling each other as to be with difficulty distinguished. The finest kind, known as precious, noble or oriental opal, is partially transparent and of a bluish or yellowish white, with a beautiful play of brilliant colors produced by small fissures which refract the light. It is never cut in facets, as diamonds are, because its play of colors is better on a convex surface. It is used in jewelry. The finest opals are brought from Hungary. Opal is also found in Saxony and in South America. The common opal is white, yellow, green, red or brown, but without any play of colors. It is not at all rare, occurring in veins and holes in rocks.

Op'era is a drama which is sung, accompanied by a full orchestra or by a chorus of musical instruments. It makes use of the aria or song, duets, trios, the recitative or declamation, instrumental interludes or whatever the situation requires. The introduction or opening is called an overture. There are three chief classes or schools, the Italian, the German and the French. The Italian opera is the earliest, dating as early as 1600, and is noted for melody. Scarlatti (1659–1725) may be considered its founder. The most famous modern Italian composer is Rossini, his *Barber of Seville* and *William Tell* both retaining a place on the modern stage. Bellini, Donizetti, and Verdi are other well-known composers of this school.

The early opera in Germany was Italian, Dresden and Vienna being the centers. The national school was founded at Hamburg by Keyser, who wrote more than 100 operas (1694–1734). Mozart's first work was Italian in form, though surpassing the Italians in their own field; but his *Magic Flute* was the first national romantic opera. Beethoven composed but one opera, *Fidelio*, while Weber used the national folklore in *Der Freischütz* (Free Archer) with great effect. Melodrama originated in Germany. The singer recites his part in a speaking voice, while the music of the orchestra seeks to give the meaning of the scene to the audience.

French grand opera was founded by Sully, a Florentine, and reformed by Glück, the German composer, while Cherubini, Rossini, Meyerbeer and Wagner were foreigners who aided in its development. The French school paid particular attention to rhetoric, and the use of the recitative or recitation has always been prominent. Italian opera became the fashion in London from the time of Händel, and was introduced into America in 1825. See *Memoirs of the Opera* by Hogarth and *Essays on Modern Opera* by Edwards.

Opera-Glass, an instrument for making distant objects appear brighter and more distinct. An ordinary opera-glass is essentially two telescopes, of the type employed by Galileo, so mounted in one frame as to produce two images of the same size, one for each eye. The principle of the opera-glass is that of the astronomical telescope, except that the latter uses a converging eyepiece, while in the opera-glass a diverging eyepiece is used. The reason for this difference is twofold: The diverging eyepiece gives an upright image; and the total length of the opera-glass is the difference between the focal lengths of the object lens and the eye lens. This makes the opera-glass short, so that it can be easily carried in the pocket. If a converging eyepiece were used, the distance between the objective and the eye lens would have to be equivalent to the *sum* of their focal lengths, which would make the instrument unwieldy. The optical behavior of the opera-glass will be clear from the accompanying figure, where B_1 B_2 indicates the object glass, through which pass three rays from a very distant object P. The pupil of the eye is indicated by *p p*, and the image of P is seen erect in the direction indicated by the three rays P_1. The principal focus of either lens falls at some point within the eye. The angle which the image subtends at the eye is much greater than that under which the object is seen with the naked eye. Zeiss of Jena has recently introduced an enormous improvement into the ordinary opera-glass, by using (instead of two Galilean telescopes) a pair of astronomical telescopes. But he avoids the difficulty of extreme length, mentioned above, by placing a pair of prisms between the two lenses, such as is shown in the accompanying figure. The path of the ray between the two lenses is thus doubled upon itself, securing a short length for the instrument and at the same time giving an erect image and a large, clear field. These prisms allow him also to place the two objectives a foot or so apart, while the eye lenses are at a distance suited to the eyes. Equipped with such a glass, a field officer can stand behind a tree in safety while he is watching the operations of the enemy. It need hardly be added that the armies and navies of all civilized countries are now furnished with these glasses.

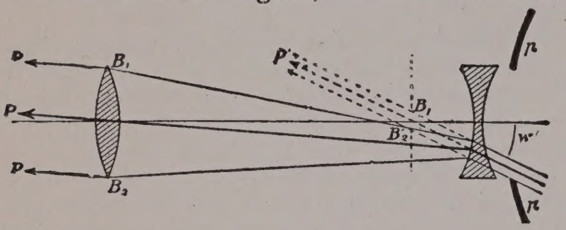


FIG. 1

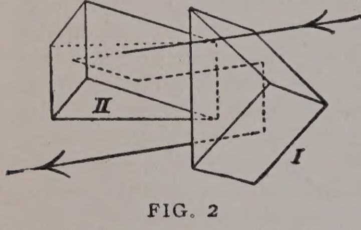


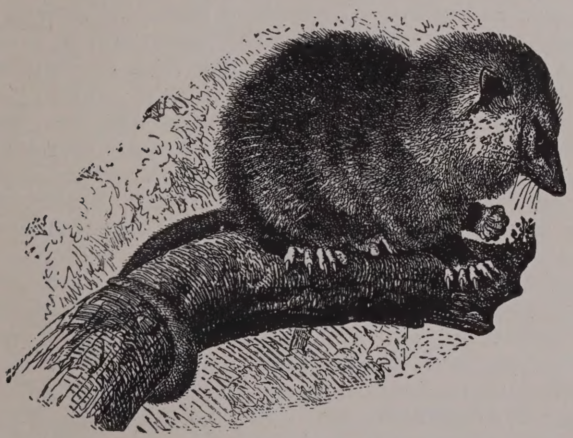
FIG. 2

Ophir (*ō′fẽr*), a place mentioned in the Bible, from which the navy of Solomon brought gold, precious stones and sandalwood. The voyage took three years. It was on the eastern coast of Africa, in Arabia or in India, but in which is doubtful. Josephus places it on the peninsula of Malakka.

O′pium is the dried juice of the unripe seed-vessels of a kind of poppy. The poppy is cultivated in India, Persia, China, Turkey and Egypt. It requires a very rich soil, and irrigation is often used as an aid to cultivation. The main opium district in India is a large tract on the Ganges, about 600 miles long and 200 broad. In India the seed is sown in November, the plant blossoms in January or later, and in three or four weeks after, when the poppy heads or capsules are about as large as a hen's egg, the field is ready for work. The collector takes a small instrument made of four little knives tied together, looking like the teeth of a comb, and with this cuts or scratches the poppy heads. This is done in the afternoon, and the next morning a milky sap can be collected from the heads by scraping with a kind of scoop into an earthen vessel. The vessel is kept turned on its side so that any watery fluid may drain out, and as the juice dries it is turned often, so that it will dry equally. It takes three or four weeks before it is thick enough to be used in the factories. It is then thrown into great vats in the factories and kneaded, and made into balls or cakes, which are dried and packed in chests for the market. Opium has a bitter taste and a peculiar, heavy odor. It is poisonous, but makes a most valuable medicine, in which form it is used to allay pain and produce sleep. The habitual use of the drug is known as opium-eating or the opium habit, and is made use of to relieve pain or sleeplessness, when it soon becomes a habit most difficult to overcome. The amount usually taken is about three grains a day, though De Quincey (himself a slave to the habit) says that he used sometimes 8,000 drops of laudanum (a form of opium) daily. It acts as a stimulant, followed by depression and nervousness, requiring a fresh dose to remove them. Another way in which it is used is in smoking, a practice most common in China and in India. The opium prepared for smoking is called *chandu*, and is a watery extract about twice as strong as the drug. A piece of opium as large as a pea is placed in a small cup at the end of a pipe and lighted, and the smoke inhaled. The opium is distilled by the process, and there is very little morphine in the smoke. There are said to be a million opium smokers in the United States. Excessive use of it wrecks the constitution and seems to destroy also the moral faculties. For the opium wars see CHINA. See *Opium and the Opium Appetite* by Calkin and *Opium Smoking in America and China.*

Oporto (*ô-pôr'tŏŏ*), the second city in Portugal, is situated on the Douro, three miles from the Atlantic. The city climbs the steep banks of the river, its houses, gayly painted, making a bright picture set off from the pine-covered mountains behind it. On one of the crags overlooking the river is a crystal palace surrounded with gardens. The old cathedral was built by Henry the Navigator; the Gothic church was founded in 559; and the former monasteries are used, one as a citadel, one as an exchange and one as barracks. There are a medical school (246 students), observatory, a fine art academy (133 students), library of 250,000 volumes and two picture galleries. The railroad to Lisbon crosses the river a little above the city on one of the finest arch bridges built. The manufactures are cloth, silk, hats, porcelain, ribbons, tobacco, soap and metal casting, distilling, cork-cutting and sugar-refining. It is the chief seat of the export trade in port wine, and in the vicinity, in 1900, were 15 cottonmills. Oporto was the stronghold of the Christians in the peninsula against the attacks of the Moors. The people in 1828 opposed the usurper, Miguel, who executed many of them; but they supported Pedro of Brazil, and withstood the besiegers thirteen months. Population 167,955.

Opos'sum, animal representing the marsupials or pouched animals in the New World. There are some 16 species, varying in size from a cat down to a mouse. Some are provided with pouches on the under side of the body in which the young are reared, and others have no sign of a pouch. In those forms without a pouch the young, when fully developed, are frequently carried on the back, with their tails twined round that of the mother. The Virginia opossum is common from the central United States to Brazil. It is one of the largest members of the group, being about the size of a cat. The hair is long and coarse; black and white, giving the appearance of grayish-white, underneath the fur white and woolly; nose and lips white; ears erect, hairless, black tipped with white; tail prehensile, flesh-colored, almost bare. In general appearance the animal reminds one somewhat of a little pig. The Virginia opossum brings forth her young when they are very small, only about half an inch long; as soon as one is born the mother places it in her well-developed pouch, where it and its brothers and sisters are kept several weeks—sometimes there are a dozen to carry about and provide with milk. The little ones sleep and eat and grow. Perhaps by the time they are the size of rats and able to ride on her back there will be a second brood in the pouch. There are two or three litters a year. As great eaters, opossums may again be likened to the pig: they eat everything and anything: insects, wild fruit and berries, varied with roots, reptiles, crayfish, eggs, small rats and mice, with additions of poultry, corn, sweet potatoes and other farm-yard delicacies. As enemies of the destructive cotton-rat they are highly valued. They hunt mainly by night, sleep by day, live in trees. They are expert climbers; in going up a tree they use tail and hand-shaped feet very much as does a monkey. They dislike cold, seldom come forth when snow is on the ground, remaining in their dens for warmth and comfort, having stored away fat for this time of need. The opossum's habit of feigning death when frightened or slightly injured is well-known, and in this he is a consummate actor—lies stretched out motionless, breathless, nose colorless, white lips apart and the teeth gleaming stark, deathlike. See Stone and Cram: *American Animals;* Hornaday: *American Natural History.*



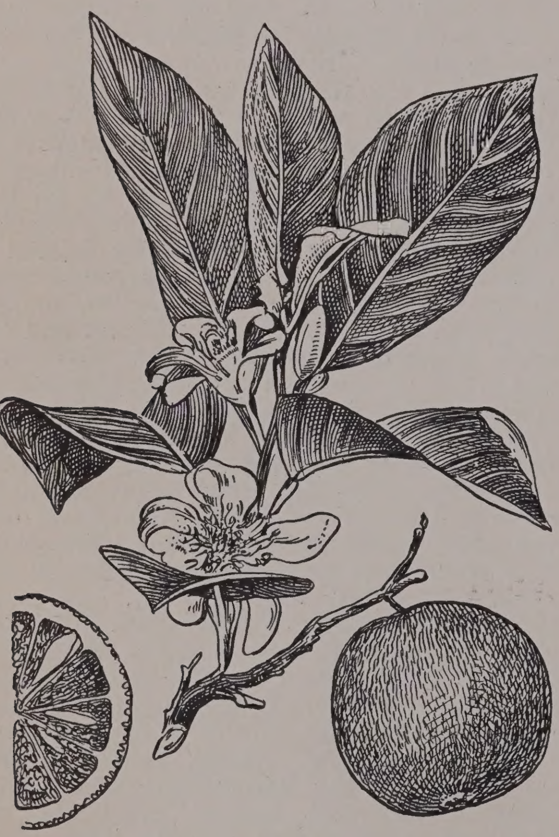
OPOSSUM

Op'tics. See LIGHT, TELESCOPE, CAMERA EYE, OPERA-GLASS, MICROSCOPE, PHYSICS.

Or'acle, in ancient times a revelation by some god in answer to questions, and also the place where the revelations were given. The revelations were usually made by the mouths of priests or priestesses, and sometimes by other signs. At Dodona the oracle answered by the motion of leaves or the murmuring of the waters of a fountain, and the oracle of Ammon responded by the shaking of the statue of the god. The Egyptian temples were nearly all oracles, and there were oracles among the Babylonians and Phœnicians. The most famous oracle of the Greeks was the one at Delphi. The inquirers offered sacrifices, walked around the oracle, with laurel crowns on their heads, and inscribed their questions on leaden tablets, many of which have been discovered. The answer was accepted as final and having anthority, and usually was just and reasonable. Other oracles were at Ismenus, Delos and Olympia. See *Greek Oracles* by F. W. H. Myers and *Religious Antiquities* by Schomanns (translated).

Oran (*ô-rän′*), a city in Algeria, is situated on the Gulf of Oran, 260 miles southwest of Algiers. The harbor is protected by moles, built in 1880. The city lies at the foot of a hill, defended by forts, and has two citadels. There are a Roman Catholic cathedral, a Mohammedan mosque, a military hospital, a college and a seminary. The principal exports are alfa, iron-ore and grain. The city was founded by the Moors, and in the 15th century was very prosperous. It was famed for cloth, arms and fine public buildings. In 1509 the Spaniards, after taking it, made a penal settlement of it. Captured by the Turks in 1708, it was retaken by the Spaniards in 1732, who abandoned it in 1790 after it was almost destroyed by an earthquake. The French took possession in 1831. Population 85,801. Oran is also a department in Algeria, area 44,616 square miles, with a population, embracing both the military and the civil territory, of 1,122,358.

Or′ange, the fruit of *Curus aurantium* and its varieties. To the same genus belong the limes, citrons, grape-fruits etc. All the species of the genus are natives of tropical and subtropical Asia, but are now extensively cultivated throughout the warmer regions of the world. In the United States orange cultivation centers in Florida, the delta region of the Mississippi and in California. Portions of Texas, New Mexico and Arizona are well-adapted for commercial cultivation. The orange was introduced into this country by the early Spanish explorers, here increased and formed wild groves of large extent. It is a long-lived tree, bears to a great age, is evergreen, and its glossy leaves are set off by snowy blossoms of exceeding fragrance. Blossom, green and ripe fruit may be seen at one time on the same tree. In cultivation it rarely exceeds 30 feet in height, and is a low-branching tree. It is attacked by various diseases, rot, blight and mould, and requires careful cultivation and watching. Scale insects have worked much damage to the orange crop. The red scale is kept in check by fumigating and by spraying. The white or fluted scale, formerly very destructive in California, has been practically vanquished by the Australian ladybird. Oranges are usually cut by hand and kept a few days before packing. There are numerous cultivated forms, the so-called navel oranges being an accidental variation. Among the commoner forms are the common sweet orange, a native of India, among whose most prized cultural forms are the Washington navel and Riverside navel; and the mandarin or kid-glove orange, a native of China, various cultivated forms being known as mandarins and tangerines.



ORANGE

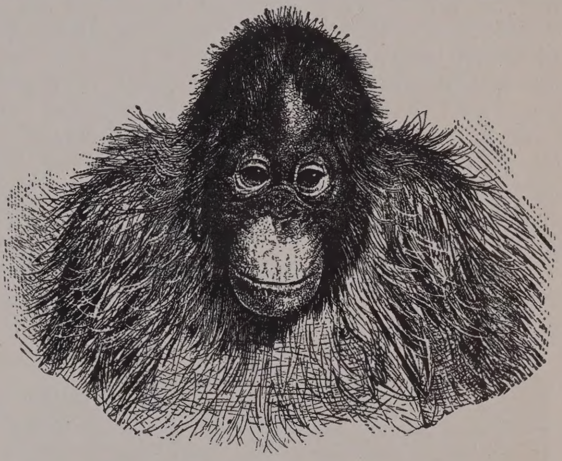
Orange, N. J., a city of Essex County, 12 miles west of New York. The name also includes parts of the townships of East, West and South Orange, all suburbs of New York, often called the Oranges. The region is laid out in beautiful parks, with elegant homes, rising above each other, ending in a broad crest on the top of Orange Mountain, 650 feet in height. Llewellyn Park (50 acres) is on the eastern slope of the mountain in West Orange and contains many fine residences. Near it is the Edison laboratory. The chief manufacturing establishments are hat factories and printing plants. Among its prominent buildings are Music Hall, Masonic Temple, the Metropolitan and Decker buildings, Orange Memorial Hospital and the House of the Good Shepherd. The city has excellent public and parochial schools, a training school for nurses, a city library and Stickley Memorial Library. At South Orange are Seton Hall (R. C.) for men and boys and a theological seminary. Population 37,000.

Orangemen, an association of Scotch-Irish Protestants founded in 1795 in the north of Ireland for the purpose of sustaining the Protestant religion and upholding the authority of the sovereign and the laws of the United Kingdom. It originated and chiefly flourishes in Ulster, but is found in other parts of the United Kingdom, in the British colonies and in the United States. The association derives its name from William III, Prince of Orange. It declined after 1813, but revived in 1827. It was dissolved by the House of Commons as a secret order in 1830, but revived in 1845. In October, 1857, the lord-chancellor of Ireland ordered that justices of the peace should not belong to Orange Clubs. July 1st and 12th are celebrated by Orangemen as anniversaries of the battles of the Boyne and Anghrum.

Orange River, the largest stream in South Africa, flowing west into the Atlantic Ocean. It is 1,000 miles long, but is navigable only in the rainy season, and its mouth is obstructed by a bar.

Orange Free State. This British possession in South Africa, after having existed for 46 years as an independent republic under the name of the Orange Free State, was, after military occupation by the British forces in consequence of the Boer War, annexed by proclamation on May 4, 1900, and for ten years was known as Orange River Colony. In 1910 it became part of the Union of South Africa and its original name was restored. There is an elective council of 25 members, with power to legislate on provincial matters; the executive power is vested in an executive committee, comprising a provincial administrator appointed by the governor general, and four members chosen by the council. The area of the colony is 50,392 square miles, the total population being, in 1908, natives included, 435,000. Of this number, about 100,000 were white, who chiefly engaged in agriculture and in raising sheep, cattle, horses, goats, ostriches. This population is chiefly of Dutch origin. The colony was founded by the Boers who trekked from Cape Colony in and after 1836, and was declared independent in 1854. It lies between Vaal and Orange Rivers, on a plain rising from 3,000 to 5,000 feet, with bluffs or slopes toward the rivers that border it, and dotted with *kopjes* or flat-topped hills. The prevailing religion is that of the Dutch Reformed church; while the Roman Dutch law has hitherto been in use. The Dutch Reformed church still preponderates in numbers, but there has been a great gain among other Protestant bodies and Roman Catholics since 1900, the aid formerly given by the Free State government to the first named body having been discontinued. Education is going steadily forward, fees having been entirely done away with in all elementary schools. A college, normal school, high school and many primary schools have been established, and education is compulsory, but little is being done among the blacks. Bloemfontein is the capital, with a present population of 38,000. The undulating plains of the interior afford excellent grazing. The colony is rich in coal-mines; while in and on the borders are valuable diamond mines, the yield from which, as well as of garnets and other precious stones, has been phenomenally large. Some gold has been found. Rubies, sapphires, emeralds and other precious stones are reported from Hope Valley. There is now a government department of mines. The imports are chiefly wearing apparel, cottons, blankets, food and drink, woodenware and hardware. The exports are largely wool and diamonds, most of them going to Cape Colony. The colony belongs to the South African customs-union. The Free State kept no statistics regarding mining. A railway, constructed by the Cape government, connects Orange River (at Norval's Point) with the capital as well as with the Transvaal, lying north of it. The length of the railway lines in the colony is about 900 miles. There are 2,143 miles of telegraph lines, giving communication with Cape Colony, Natal, Transvaal and Basutoland. See TRANSVAAL, CAPE COLONY and BOER WAR.

Orang-Utan or **Orang-Outang** (*ō-răng' ōō-tăng'*), one of the higher apes, found in the swampy forests of Borneo and Sumatra. With the chimpanzee and the gorilla, it approaches closely to man in structure. A full-grown male reaches a height of four feet and four inches, but the outstretched arms cover seven feet eight inches. The body is bulky and covered with long, reddish-brown hair. The legs are short, but the arms are so long as to reach the ankles when the animal is erect, and, in walking the knuckles are placed on the ground. Orang-utans, however, are awkward on the ground and prefer the trees, where they can travel five or six miles an hour, without special effort, by swinging along on the branches, which they grasp mainly with their hands. They feed on fruits and succulent shoots, being strictly vegetarian in their diet. They get most of their food on the trees, but go to the ground for water. They live in pairs. As a rule they are peaceable, but when disturbed are reputed fierce. They retire to rest at sundown in nests of broken boughs 20 or 30 feet above ground. In captivity they are not so active and intelligent as the chimpanzee. See APE.



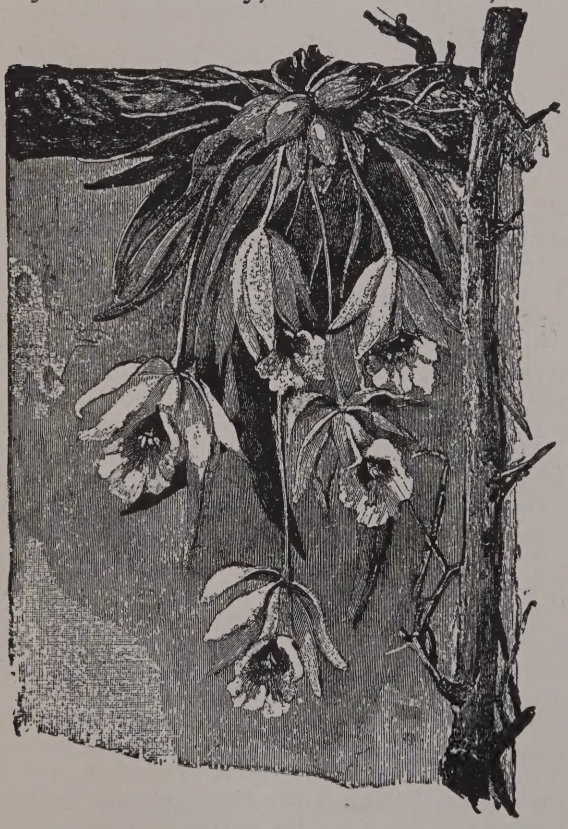
ORANG-OUTANG

Or'ato'rio, a sacred story set to music and accompanied, as in the opera, with a chorus and orchestra or band of musical instruments, but without the use of scenery or costumes or acting. Its name is derived from the oratory of the Church of Santa Maria

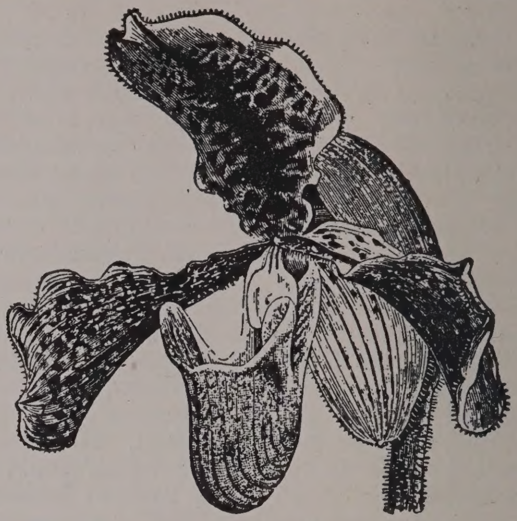
Maggiore in Rome, where, from 1541 to 1594, musical performances of this class were first arranged. The oratorio was produced in Rome in 1600, the same year in which the first opera was given in Florence. The first development of the oratorio had the passion of Christ for its subject, and the greatest passion music is the *St. Matthew*, written for service on Good Friday by Sebastian Bach in 1729. The next form was the epic, used by Händel in 15 grand oratorios, the greatest of which are *Israel in Egypt* and the *Messiah*, by Haydn in his *Creation* and by Mendelssohn in *Elijah*. The modern oratorio uses more of the dramatic element, and inclines to the form of a cantata, of which Liszt's *St. Elizabeth* and Schumann's *Paradise and the Peri* are fine examples. See *Standard Oratorios* by Upton.

Or′chardson, William Quiller, R. A., a Scotch painter, was born in 1835, at Edinburgh, where he studied art. He is considered to belong to the first rank of genre painters, that is, a class of paintings whose subjects are taken from everyday life. His pictures, many of the later of which are fashionable interiors and portraits, are very popular and exquisitely finished. Among the best known are *The Challenge*, *Napoleon on the Bellerophon*, *The Bill of Sale*, *Hard Hit*, *After*, *The Salon of Madame Récamier*, *The Rift within the Lute*, *Her Mother's Voice*, and *The Young Duke*.

Orchids (*ôr′kĭds*), species of a great monocotyledonous family, the *Orchidaceæ*, containing over 6,000 species. Their greatest display is in the tropics, where many of them are brilliantly colored epiphytes. There are many beautiful species, however, in the temperate regions, chiefly in bogs. The flowers are very much modified, always having a conspicuous spur, at the bottom of which nectar is secreted. Orchids are very highly specialized in reference to pollination by insects. Each kind of orchid has its own kind of insect, and all of the elaboration of the flower is connected with this fact. In greenhouses orchids are among the most prized of plants, on account of the showy colors and the strange forms of the flowers, the most conspicuous being the epiphytes from the tropical forests. Among the best known forms are the common lady-slippers or moccasin flowers (*Cypripedium*), in which the spur is replaced by a conspicuous sac, the so-called slipper or moccasin. (See LADY'S SLIPPER). Another of our beautiful native orchids is the white-fringed orchis, found in swamp and cranberry march in New Jersey and north and westward to Minnesota. The leaves are alternate, lanceolate; the flowers bloom in July, are milk-white, lower lip heavily fringed, grow in numbers on a short spike. The yellow-fringed orchis closely resembles the preceding but is taller, has bloom of a rich orange. The large purple-fringed orchis is a queenly flower, found in meadows and rich woods from Nova Scotia and New England to North Carolina and Michigan. The flowers, June to August, are of violet hue, large and fragrant, the lip often an inch and a half long, the cluster in dense racemes. In the evergreen woods of the north one may in July find the cool-looking green and white bloom of the great green orchis, flowers clustered loosely on a long spike, the two large leaves of the plant lying flat on the ground. See Watson: *Orchids*.



ORCHID



LADY-SLIPPER

Ord, Edward Otho Cresap, an American general, was born in Cumberland, Md., Oct.

18, 1818. He was graduated from West Point in 1839. He served in the Seminole War in Florida and on the frontiers until the beginning of the Civil War, when he became brigadier-general of volunteers and was given command of the Pennsylvania reserves. He assisted in the capture of John Brown in 1859 and gained the battle of Dranesville in December 1861. In May, 1862, as major-general of volunteers, he was given a command in the department of the Mississippi and took part in the battle of Iuka and the capture of Vicksburg. In 1865 he was in command of the army of the James and the department of Virginia. He was prominent in the capture of Petersburg and the pursuit of Lee. The arrival of his troops to support Sheridan compelled Lee to surrender. After the war he became a brigadier-general in the regular army, had command of various departments, and retired in 1881 with the rank of major-general. He died at Havana, Cuba, on July 22, 1883.

Ordinance of 1787, The, an act of Congress in July, 1787, for the administration of the affairs of the great Northwest Territory of the United States. The ordinance contained this oft-quoted provision: "Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged." The ordinance contained six articles which were expressly stated to be of the nature of a contract between the people of the states already existing and the people of the Northwest Territory. It guaranteed freedom of worship and prohibited slavery in the lands granted to the Ohio Company; and it looked clearly forward to the time when these lands should be organized under permanent constitutions and government. A provisional government was provided for the territory until the population reached 5,000, when they could form a House of Representatives.

Oregon (*ŏr'ē-gŏn*), one of the Pacific States of the American Union is situated between the 42nd and 46th parallels of latitude. It is bounded on the north by Washington; on the east by Idaho; on the south by Nevada and California, and on the west by the Pacific Ocean. The State is rectangular in shape, with an extreme breadth of 350 miles from east to west, and width of 285 miles from north to south. Oregon extends over an area of 9,699 square miles, 1,092 miles of which are water.

Surface. Two mountain ranges, the Coast Range and the Cascade, run parallel with the Pacific Ocean. West of the Coast Range lies a comparatively level country, varying in width from ten to thirty miles. This is cut into many little valleys by divides, extending westerly from the mountains. Notable among these valleys are the Nehalem, the Yaquina, the Alsea, the Sinslaw, the Umpqua, the Coos Bay country and Rogue River Valley. The Coast Range rises to an altitude of 4,000 feet. Dense forests spread over its peaks. The Willamette Valley lies between the Coastal Range and the Cascade Range, drained by a river of the same name, which rises in a divide that joins the two great ranges about 100 miles from the southern border of the State and flows in a northerly direction to the Columbia. Willamette Valley averages about fifty miles in breadth, with a low elevation and very fertile soil. South of this divide the country is divided by Umpqua and Rogue Rivers, which flow through passes of the Coastal Range to the Pacific Ocean. The Cascade Mountains run parallel with the Coastal Range about 150 miles furthur inland. This mountain range is an extension of the Sierra Nevada and has many notable high peaks, as Mount Hood with an altitude of 11,225 feet; McLaughlin, 11,000 feet; Jefferson, 10,200 feet, and the Three Sisters, 9,420 feet. Many of these peaks are covered with snow the year round and with heavy forests to the snow lines. In eastern Oregon the rivers flow to the north and are quite far apart, although frequent enough to make irrigation practicable in this section of the plateau country. The Blue Mountains rise in northeastern Oregon, forming the Columbia River drainage. The river forms the greater part of the northern boundary of the State. In southern Oregon spreads a region of large lakes, including Klamath Lake in the heart of the Klamath Mountains, and the noted Crater Lake and National Park.

Climate. Just as the State is divided into two great topographical regions, so it is divided into two climatic regions. In eastern Oregon, hot, dry summers prevail, and pleasant autumns with cool clear weather. Only occasional showers fall here until December. Winters are cold with considerable snow, the cold lasting until late in the spring. The mean annual temperature is forty-four degrees, ranging between 102 degrees to thirty-two degrees below zero. The climate is far more uniform along the coast, due chiefly to the Japanese Current which strikes the coast-line farther north and travels in a southerly direction. It is humid and mild. Many winters pass without snow and many summers without an electrical storm. The mean annual temperature at Portland is fifty-two degrees. Tornadoes and hurricanes are unknown, while heavy rainstorms, of cloudburst proportions, are common in eastern Oregon.

Minerals. Many important mineral products are found in the State, gold having been the most productive mineral over the greatest period of time. The chief minerals include mercury, silver, copper, zinc, platinum, lead, iron, gypsum, quicksilver, asbestos, nickel and coal. The mercury output in 1931 amounted to 5,011 flasks valued at $437,716, while the gold output for the same year amounted to 15,301 ounces, which was valued at $316,300. There were 7,487 ounces of silver and 9,332 pounds of copper mined in 1931. The value of all mineral production in Oregon in 1930 totalled $6,169,989. Sandstone, limestone, granite and fine building stone are quarried throughout the State. An excellent quality of clay, used in manufacturing brick and tile, is also found.

Production and Industry. One-half of the standing saw timber in all the United States is found in three Pacific States. Over 400 billion feet of such timber are available in Oregon. Many trees are over 300 feet in height and are extremely valuable in the manufacture of furniture. The redwoods are found in the southwestern corner of the State, while the more important trees cut are yellow pine and spruce, white and Douglas fir, larch, hemlock and cedar.

Stock raising in eastern Oregon is one of the leading industries of the State. Approximately 45,000,000 acres are devoted to pasture for sheep and cattle. On January 1, 1932, there were 185,000 horses; 790,000 cattle, including 214,000 milch cows; 3,000,000 sheep and 230,000 hogs on the farms of Oregon. In 1930 the 16,548,678 acres of land under cultivation in the State were divided into 55,153 farms. The government on June 30, 1932, held 12,920,334 acres of land which are opened to entry. Oregon ranks first in the United States in the production of hops with 13,020,000 pounds produced in 1932. Other leading crops are winter wheat, 15,020,000 bushels of which were produced in 1932; 6,802,000 bushels of oats; 36,000 tons of fresh prunes; 1,705,000 tons of hay and 5,040,000 bushels of potatoes. Rye, barley and flaxseed are other important crops.

The fruit industry of Oregon has made the State famous throughout the country. Oregon apples are especially famous. The yield of apples, plums, peaches, pears, cherries and apricots is over 7,000,000 bushels annually. The small fruits, such as strawberries, cherries and loganberries, grow abundantly in the State.

Irrigation is extensively practised in eastern Oregon. More than 900,000 acres in Harvey, Baker and Malheur counties watered in this manner. Here are found extensive orchards and alfalfa meadows. Dairying is a rapidly developing industry, as is sheep raising. There was 23,750,000 pounds of wool clipped from 2,900,000 sheep, and 392,500 pounds of mohair clipped from 115,000 goats in 1932.

Since the beginning of the history of the Great Northwest, the Columbia River has been famous for its salmon. Oregon salmon fisheries are now centered at Astoria, at the mouth of the river. Sturgeon, halibut, oysters, cod, smelt, carp, herring, crabs and clams are abundant in Oregon waters. Two-thirds of the canning of fish is accomplished on the Oregon side of the river. There were 353,697 cases of fish produced in 1931.

Manufacturing is developing rapidly in Oregon due to the availability of abundant water power and the vast resources within the State. The leading industry of the State is lumbering and the manufacture of its varied products. Cut lumber is shipped to all parts of the world with more than a billion feet sent through the Panama Canal to the Atlantic Coast and European markets.

Portland is one of the leading cities in the United States in the manufacture of furniture. Ship-building, which received such great impetus during the World War has since developed into a leading industry of the State. The Douglas fir found in the Oregon forests is the most excellent timber found in the world for masts and spars of ships. Laths, shingles, wood pulp and paper are among the by-products of lumber which are produced in Oregon. Other important industries include tanneries, wool manufacturing, fruit and fish canneries, coffee and spice mills.

A huge government project was put under way in Oregon on July 17, 1932. The Ouyhee Dam, 530 feet high from bed rock, the highest in the world, will provide water to irrigate 123,000 acres of land near the Idaho boundary. This reclamation project will cost the United States Government approximately $18,000,000. The State had developed 363,832 horse power units on January 1, 1933.

Transportation. Oregon has a well developed system of transportation. There are 5,150 miles of steam railways and 540 miles of electric track. The large trunk lines traversing the State, with the terminal at Portland, include the Southern Pacific; the Oregon Railway and Navigation Company; the Union Pacific, and the Spokane, Portland and Seattle Railroad. Portland, a city of 100 miles inland, is situated at the head of deep sea navigation, and the Willamette River from Portland to Eugene, a distance of 150 miles is navigable. By dredging the inland waterways and extending them by a canal system, Oregon can boast of a long coast line with many harbors, built especially to handle ocean navigation.

The State has a splendid system of highways, with 4,468 miles of primary roads, 3,765 miles of which are hard surfaced. The secondary highways include 2,031 miles, 1,452 miles of which are paved. The counties of the State maintain 43,650 miles of roads, 11,130 miles of which are paved.

Population. The population of Oregon increased more than twenty-one per cent during the decade between 1920 and 1930. On July 1, 1930, there were 953,786 inhabitants in the State, an increase of 170,397 since the census report of 1920. Eleven per cent of the total population were foreign born. Indian reservations extended over an area of 1,756 square miles in 1931, upon which 4,260 Indians dwelt. More than fifty-one per cent of the State's entire population is concentrated in the towns and cities. The most important cities, with their populations in 1930, are: Portland, 301,815; Salem, the capital, 26,266; Eugene, 18,901; Klamath Falls, 16,093; Medford, 11,007, and Astoria, 10,349.

Education. The school district, governed by an elective board of from three to five directors, is the unit of the school system. This board manages the finances of the district, and elects the teachers. A county superintendent supervises the rural schools of each country. The funds for public schools are derived from the interest on the irreducible school fund, a county tax and a district tax. Compulsory education is enforced for children between the ages of eight and sixteen years, and those between the ages of sixteen and eighteen who are legally employed, are required to attend part time or evening sessions, unless they have completed the course of public school instructions. There were 2,081 elementary schools during the school year 1930-31 with 152,950 pupils enrolled, and a teaching staff of 5,529; 274 high schools with an enrollment of 49,034 pupils and 2,370 teachers. The State Teachers' Colleges located at Ashland, Monmouth and La Grande had an enrollment of 2,500 students including 1,122 summer students and 104 teachers during the school year 1931-32.

Higher education was placed in the hands of a State board, beginning July 1932. The administration of the three normal schools, the State University, the State Agricultural College and the Medical School is under the supervision of this board. The University, located at Eugene, was founded in 1872 and opened for instruction in 1876. In 1933 there was a student body of 2,511 and a faculty of 231 at this institution. The college departments of the University consist in literature, science, art, law, journalism, education, commerce, medicine, music, architecture and a graduate school. The State Agricultural College at Corvallis is the largest of the State's institutions of higher learning. Here an agricultural experiment station with nine branches is maintained, an engineering experimental station, an extension service in agriculture and home economics and seven schools of instruction. In 1933 there were 2,482 students enrolled at this college, with a faculty of 249.

Government. Oregon has been a very progressive state in legislation, initiating the national movement for direct primaries, the initiative and referendum and the recall systems. The State enforced a law of Prohibition independent of the National Amendment. The rights of the people to the initiative and referendum were adopted in the State Legislature in 1902. The State Constitution was fully revised and amended from its original form, as adopted when the State was admitted to the Union in 1859. The legislative body comprises a Senate with thirty members, and a House of Representatives of sixty members. Senators are elected to serve four year terms, half of the members retiring every two years. Members of the House of Representatives serve two year terms.

The executive power is vested in the Governor, Secretary of State, Treasurer, and Attorney-General, each serving a four-year term. The Governor is restricted to two terms only in twelve years.

The State is divided into thirty six counties and is represented in the National Congress by two Senators and three Representatives.

History. The region now included in the State of Oregon was first visited by Bartolme, a Spaniard in 1543. Three years later Sir Francis Drake stopped along the coast seeking a route home to England by the Northwest Passage. Juan Perez, also a Spaniard, visited the coast in 1774, a journey which is now recognized as the first real undisputed exploration of Oregon. The following year Bruno Heceto returned with glowing accounts of a great river, which was undoubtedly the waters of the Columbia. Not much was known of the coast line, however, until Kendrick and Gray visited this region. These two explorers were sent out by Boston Merchants on a fur trading expedition and spent the winter of 1788-9 in Nootka Sound. Gray returned again in 1792, entered the mouth of the Columbia River, and named it for his ship. This expedition gave the United States the right to all the territory drained by the Columbia and its tributaries. This claim was further substantiated by the acquisition of land through the Louisiana Purchase and again in 1805-06 when Lewis and Clark passed through this territory on their famous historical expedition. In 1811 the first permanent settlement was made by the establishment of a fur trading post at Astoria by the Pacific Fur Company. The post was named in honor of John Jacob Astor, the president of the company.

Russia, Spain and England all laid claim to this territory besides the United States. Russia and Spain soon relinquished their rights through treaty agreements. In 1818 the United States and England agreed to leave the region open to settlers and traders of both countries for a period of ten years. At the expiration of this time, the agreement was renewed for an indefinite time. The Hudson Bay Company, successors to the Pacific Fur Company, enjoyed a complete monopoly of the fur trade, and through its chief, John McLaughlin, a form of government was organized, administering political and judicial authority. By the year 1844 this region had become quite thickly settled and the Americans demanded that a definite boundary be established between Canada and the United States. A tense situation arose between Great Britain and the United States, which was finally settled by a joint commission in 1846. The treaty, concluded at that time, stipulated that the boundary was to be approximately the 49th parallel from the Rocky Mountains to Fuca Strait. In 1848 Oregon was made a territory—just at the time of the great gold rush to California. Many men left to return to their farms, or to take up new lands. Oregon was admitted to statehood in 1859.

Orestes (*ō-rĕs'tēz*), a Greek hero, the son of Agamemnon and Clytemnestra. His father was murdered by Clytemnestra and her lover Aegisthus, but Orestes was saved by Electra, his sister, and brought up at the court of his uncle in Phocis. Pylades his cousin joined with him in his efforts to avenge his father's death, the pair going secretly to Argos and killing Clytemnestra and Ægisthus. But realizing that he had killed his mother, Orestes became mad and fled from land to land, pursued by the Furies. Learning from Apollo that he could be cured of his madness by bringing the statue of Diana from Tauris in Scythia to Athens, he and Pylades journeyed there, but were seized to be sacrificed by the natives. The priestess Iphigenia recognized her brother in Orestes, and with her help they all escaped, carrying the statue with them. Orestes recovered his father's kingdom at Mycenæ, and married Hermione. The story of Orestes is a theme for the tragedies of Euripides, Sophocles and Æschylus.

Or'gan, one of the largest musical instruments. It is a wind-instrument having a large number of pipes, which produce the sounds on admission of air, which is carried to them by means of a bellows. It is played by keys and pedals. The most usual form of the organ is that seen in churches, which consists of four, sometimes of five. parts, each being almost a separate instrument. These are called the great organ, the swell organ, the pedal organ, the choir organ and the solo organ, when this fifth form occurs. Each has its own keyboard, but they are brought so close that one performer can reach all. The pedal organ is played with the feet, while the other keyboards are reached by the hands. There also is a system of stops within reach of the performer's hand, which closes or opens the pipes as the keys do. Organ pipes are made of metal and of wood. The ancient organ was worked by water, and was used in the Roman theaters, Nero being one of its earliest patrons. In the reign of Honorius 400 A. D., no nobleman's house was complete without an organ, and small ones were carried by slaves from house to house. Constantinople was the great home of organ building in the ancient world, and the first organ built in medieval Europe was patterned after one brought by Byzantine ambassadors on a mission to Charlemagne The use of the bellows in organs dates from the time of the Emperor Julian in the 4th century, though it did not come into general use until the end of the 9th century. The smallest organs ever built were made in the monasteries; they were called regals and could be held on one's palm. The largest organs in England are those of Royal Albert Hall, Alexandra Palace, Crystal Palace, St. Paul's Cathedral, St. George's Hall, Liverpool, and Leeds town-hall. Among the largest in the world are the organs at Seville, Haarlem, Rotterdam and Utrecht. The great organ in the music hall of Boston gave the first impulse to organ building in America. There are large ones at cathedrals in Montreal and Boston, Music Hall, Cincinnati, Fremont Hall, Boston, Brooklyn Tabernacle and the Auditorium in Chicago.

The American or cabinet organ is a reed organ, the outgrowth of the melodeon, in which reeds are used but not pipes, and the wind is forced in by bellows worked by the feet. The Mason and Hamlin Organ Company, founded in 1854, built the first cabinet or parlor organs, making use of an invention of Hamlin's, which consisted in so twisting and bending the reeds as greatly to improve the tone. These organs have been improved, and are made in all styles and sizes, some of the larger nearly equaling pipe organs.

Or'igen, one of the most celebrated of the Christian Fathers, was born at Alexandria, 185 A. D. His father was a Christian and a teacher of rhetoric, and he was early trained for public life. Clement of Alexandria was his especial teacher in Christianity. His father suffered martyrdom when Origen was a young man, and he then sought to support the family by opening a school himself. Bishop Demetrius appointed him master of a famous seminary for catechumens, and, having mastered Hebrew, he soon became an authority upon questions of doctrine and polity. Nevertheless, his opinions were not popular with the ecclesiastics, and he was subjected to many trials, and finally excommunicated in 231. He was received at Cæsarea, where he reopened his school with increased popularity. But the persecutions under Maximinus and Decius drove him to such extremes of suffering that he died at Tyre in 254. Origen was the first great New Testament exegete that ever lived. He devoted himself to every form of study which promised to throw the least light upon the great problems of theology and philosophy. He practiced the strictest asceticism, and voluntarily subjected himself to the most abject poverty. His work was greatly rewarded in the conversion of multitudes, among whom were many of the leading men of the east. His talents, eloquence and learning excited the praise of even the heathen writers; and while his doctrinal views have not been wholly accepted by any considerable portion of modern Christendom, his purity, unselfishness and devotion to his Master are beyond praise.

Orinoco (*ō'rĭ-nō'kō*), one of the great rivers of South America, rises in Venezuela It divides into two branches near Esmeralda, one flowing south into Rio Negro; the other branch, joined by the Guaviare, turning north and passing over the cascades of Maypures and Atures, where the river, 8,000 feet wide, narrows to 20 feet, falling over cascade after cascade, like a series of steps, and shut in by islands and rocks. The Meta and the Apuré now join the Orinoco, which flows on, four miles wide, receiving the waters of two more streams before it reaches the delta

About 120 miles from the Atlantic the delta begins, covering 8,500 square miles and stretching along 165 miles of coast. Of these many channels by which the river empties into the Atlantic, only seven are navigable. The Orinoco is 1,550 miles long; 900 miles are navigable to the falls, and 500 miles above the falls. The river usually floods the country in its course from May to January, the overflow sometimes stretching across for 100 miles. Humboldt and Schomburgh are the great explorers of the Orinoco.

Oriole (*ō′rĭ-ōl*), any one of a family of Old World birds. The true orioles are related to the crows, and are not to be confused with the so-called orioles of the New World. The latter make a strictly American family, extending from Patagonia into the United States. The two families, although entirely distinct, resemble each other in color, the prevailing shades being yellow and black. It was this circumstance that led to the use of the name for the American birds. The true orioles are common in southern Europe and abundant in Oriental and Australian regions. The golden oriole is yellow and black in color, and makes a hanging nest. It is common in southern Europe, but is rarely found in the British Islands. (See BALTIMORE ORIOLE.) Our orchard oriole is not so famous as his gorgeous relative, nor so frequently seen in the north, but their songs are very similar, the orchard oriole's being richer in tone. This bird is about one fourth smaller than the robin, black above with touches of whitish-yellow on wings and tail, below a reddish-brown. It is a summer resident, its range from Canada to Central America. The orchard oriole shows a fondness for orchards, builds there a neatly-woven basket-nest made entirely of dried grasses; in June there may be found therein four whitish, brown-spotted eggs.

Orion (*ō-rī′on*), a hero in Greek mythology, a handsome giant and hunter in Bœotia. At Chios he fell in love with Eos or Merope, and cleared the island of wild beasts to please her. When drunk he insulted her, which her father, with the help of Bacchus, avenged by putting out his eyes. He recovered his sight by exposing his eyeballs to the rising sun. There are several stories of his death; one that he was killed by Diana, whose hunter he became, because Eos had carried him off to Ortygia and offended the gods; another that Apollo, angry with Diana's love for Orion, seeing him swimming in the water, pointed out to her a black object, challenging her to hit it, and she shot it with her arrow, finding, when too late, that it was the head of her lover; a third story lays his death to the sting of a scorpion.

Orion, the brightest constellation in the northern heavens, is named after the Greek hero Orion, who was placed, with his hound, among the stars, and pictured with a girdle, sword, lion's skin and club. The three bright stars across the center of the constellation are called Orion's belt.

Orizaba (*ō-rē-sä′vȧ*), a volcano in Mexico, 15 miles north of the city of Orizaba. It is 17,362 feet in height. The last severe eruption occurred in 1566.

Ork′ney Islands, a group off the northern coast of Scotland. Twenty-eight of the 90 islands forming the group are inhabited, the largest being Pomona. Hoy has fine cliffs and a hill 1,564 feet high, but the other islands are low and treeless, with many small lakes. Farming, fishing and straw-plaiting are the principal industries. On Pomona is a group of large standing stones arranged in two circles, the inner circle 100 feet across and the outer one 360 feet across, the largest stones being in the smaller circle. The towns are Kirkwall and Stromness. At Kirkwall are the cathedral of St. Magnus, founded in 1138, and a museum with many ancient relics, among others a collection of pins, brooches, bracelets and silver coins, thought to belong to the earliest period of Scottish history, found in 1858. The Orkneys, first inhabited by the Picts, were conquered by Norse rovers and belonged to Scandinavia till 1468, when they were given to James III of Scotland as a pledge for the payment of the dowry of his wife, Margaret of Denmark. The pledge was never redeemed, and in 1590 on the marriage of James VI with the Danish princess Anne, Denmark relinquished her claim to the islands. The population, which is partly Scotch and partly Scandinavian, numbers 36,438. See *Orkneys and Shetland* by Tudor and *Description of the Isles of Orkney* by Wallace.

Orleans (*ŏr′lē-anz*), a French city, situated on the Loire River, 75 miles southwest of Paris. The Forest of Orléans, covering nearly 150 square miles, is near it. The ancient walls and gates of the city have since 1830 been made into boulevards. The Loire is crossed by a bridge 364 feet long. The noted buildings include the cathedral, destroyed by the Huguenots in 1567 and rebuilt by Henry IV and his successors; a museum; and the house of Joan of Arc. There are three statues of Joan, a bronze one having been erected in 1855. The chief industry is market-gardening, and there are some manufactures, but its trade is of most importance, as it is a railroad center, besides having river and canal routes. Orléans was a Celtic town, called Genabum in 52 B. C., when the Gauls arose there against Julius Cæsar. About 272 A. D. it was named *Civitas Aureliani* (City of Aurelius), of which Orléans is a corruption. Besieged by Attila in 451; twice plundered by the Northmen; in 1428 it was attacked by the English and delivered by Joan of Arc, called the Maid of Orleans. During the Huguenot wars it suffered severely, and in the Franco-German War was held a month by the Germans, and then became the headquarters of the army of the Loire, until its defeat on Dec. 3–5, 1870. See *Life of Joan of Arc* by Michelet. Population 72,096.

Orléans, Duke of, the title which has been used by three different French dynasties. It was first granted in 1302 by Charles VI to his brother Louis, who afterward was regent. His grandson became king as Louis XII in 1498, and the dukedom was merged with the crown. In 1626 Louis XIII made his brother Jean Baptiste Gaston, duke of Orléans and Chartres, who died childless. The title was granted by Louis XIV to his brother Philippe, whose son Philippe and grandson Louis Philippe Joseph (*Egalité*) bore the title. Louis Philippe, son of *Egalité*, was duke of Orléans during his exile, until he became king, when his son Ferdinand succeeded to the title. The Comte de Paris, the late head of the Bourbon house of France, has not used the title, which is assumed by his son, the present claimant to the throne of France, Louis Philippe Robert, who resides at Brussels. In French politics the adherents of the princes of the Orléans family are called Orleanists.

Orléans, Louis Philippe Joseph, Duke of, best known as *Egalité*, was born at Paris, April 13, 1747. His hostility to the court, especially to the queen, made him take part against the king, while lavishing his wealth in scattering liberal books and papers throughout the country. He led the 47 nobles, who in June, 1789, joined the deputies of the third estate and helped to change the states-general into a national assembly. In September, 1792, when all titles were swept away, he asked for a new name, and took the name of *Egalité* (equal). He voted for the death of the king. His eldest son, afterward King Louis Philippe, was on the staff of Dumouriez, and went with him into the Austrian camp, and at once, with the other Bourbons left in France, *Egalité* was imprisoned and by the Jacobins, when they gained power in the convention, he was convicted of conspiracy on slight evidence, dying on the guillotine at Paris, Nov. 6, 1793.

Or'nithol'ogy. See Birds.

Orontes (*ō-rŏn'tēz*), the ancient name of a river in Syria. It rises near Baalbek, and flows north between Lebanon and Anti-Libanus, as far as the city of Antioch, and then flows westward to the Mediterranean. It is 247 miles long, and in the lower part its rocky banks, 300 feet high, are covered with climbing vines, myrtles, laurels, figs and sycamores.

Orpheus (*ôr'fē-ŭs*), a Greek hero, thought to be the son of Apollo and Calliope (*kal-lī'ō-pē*), one of the muses. His home was in Thracia, where many different places claim to be his birthplace. Orpheus, by his music on the lyre, given him by Apollo, moved men and beasts, trees and rocks. On his travels with the Argonauts, his music rocked monsters to sleep and stopped falling cliffs. When Eurydice his wife died, Orpheus followed her to the lower regions, and his "golden tones" prevailed with Pluto, who allowed him to take her back, provided he did not look around while they ascended; but, looking back, he lost her forever. According to some traditions, he was killed by a thunderbolt of Zeus for revealing the divine mysteries, and by others he was torn in pieces by the Mænades, and buried at the foot of Mt. Olympus, where a nightingale sings over his grave.

Orsini (*ôr-sē'nē*), **Felice,** an Italian conspirator, was born in December, 1819, at Meldola. He studied at Bologna. As the son of a conspirator he was early admitted into secret societies, and was sent to the galleys for life in 1844. Pius IX, by an amnesty, restored him to liberty, but he was soon imprisoned for taking part in political plots. During the Revolution of 1848 he took part in the defense of Rome and Venice, and was active at Genoa and in the duchy of Modena. After its suppression he lived for some years in England, where he was intimate with Mazzini. In 1854, while stirring up insurrection in Milan, Trieste and Vienna, he was arrested and sent to the fortress of Mantua, whence he escaped in 1856 and fled to England. There he supported himself by lecturing and wrote *Austrian Dungeons in Italy*. He at last planned the assassination of Napoleon III, the great obstacle, he thought, in the way of Italian independence. With three associates he stood near the opera-house in Paris on the evening of Jan. 14, 1858, and when the emperor's carriage drove up, threw three bombs under it, which exploded, killing 10 persons and wounding 146, but not injuring the emperor or empress. He and Pieri were guillotined, March 13, 1858, the others being sentenced to penal servitude. See *Memoirs and Adventures* by himself.

Or'tolan, a class of birds belonging to the finch family. It is about six inches long, with head, neck and breast of a yellowish gray, with brown wings. It builds its nest of dry grass on the ground in open fields, though sometimes under low bushes. They are found in summer as far north as the Arctic circle, and in winter as far south as Abyssinia and India. They are caught in large numbers in nets when on their journeys, and fattened in dark rooms, as their flesh is considered a great delicacy. In Japan they are pickled with spice and vinegar. The Romans gave large sums for them, and they are still highly prized in Italy.

O'sage Orange or **Bow Wood,** a tree, native of North America, somewhat like the mulberry. It was found growing in the country of the Osage Indians, which, with its yellow globes of fruit, gave it its name. It is also called mock orange. It grows from 20 to 60 feet high, and is a very valuable tree for its wood, which is yellow, fine grained, takes a high polish, and is very durable. It is used for posts, paving-blocks and railway ties. The Osage and other Indians used it for their bows and war-clubs. The bark is used in tanning leather, that of the roots yields a dye. The leaves are used for feeding silkworms in place of the mulberry, with a difference of opinion as to the result. The fruit, large and round, with a rough skin, has a woody pulp and bitter juice, and is not eaten. The tree has been largely used in America as a hedge plant, for which its rapid growth, thorny branches and freedom from disease adapt it. It thrives in rich bottom lands, and is found at its best in Red River Valley, in Indian Territory.

Osages, a tribe of American Indians of the Dakotah family. They were found by Marquette on the Missouri in 1673, but were driven by their enemies to the Arkansas. They fought with the French against the English and against the Chickasaws. They ceded their lands at different times to the government, and in the Civil War about 1,000 of the tribe went south. In 1870 the tribe was removed to Indian Territory and placed in charge of the Quakers, where they have grown more civilized, having a school and cultivating about 2,000 acres of land.

Osaka (*ō′sȧ-kä*) or **Ozaka** (*ō′zȧ-kä*), the second largest city in Japan, at the head of the Gulf of Osaka. It covers about ten square miles, and is crossed by canals with more than 1,000 bridges. The fine castle, built of enormous stones in 1583, and the palace, which was destroyed in 1858, were perhaps the handsomest buildings in Japan. The city is one of the open ports, the headquarters of the rice and tea trade and the commercial center of the empire. The harbor does not admit very large vessels. There is a foreign settlement, occupied mostly by missionaries. Population 1,226,590.

Os′car II, Frederic, king of Sweden and Norway, was born at Stockholm, Jan. 21, 1829. He was the great-grandson of Napoleon I's famous general, Marshal Bernadotte, the first king of the now independent kingdom of Norway; he succeeded his brother, Charles XV in 1872. He followed the policy of his brother, carrying out reforms and reorganizing the army and the railroads. He published a volume of poems, a translation of Goethe's *Faust* and a sketch of Charles XII. He died on Dec. 8, 1907. See NORWAY and SWEDEN.

Osceola (*ŏs′sê-ō′lȧ*), a chief of the Seminole Indians, was born in Georgia in 1804. His father was an English trader, and his mother the daughter of an Indian chief, who took him to Florida when a child, where he became influential among the Indians. His wife, the daughter of a runaway slave, was taken from him, and for his threats of revenge he was seized and imprisoned for six days by General Thompson, whom he killed, with four others, six months afterward. This was the beginning of the second Seminole War. At the head of a band of 200 or 300 Indians and runaway slaves, he carried on the contest for nearly two years, in the almost impenetrable Everglades. On Oct. 21, 1837, while holding a conference under a flag of truce, he was treacherously seized and imprisoned at Fort Moultrie, S. C., where he died on Jan. 30, 1838. He is the hero of Mayne Reid's *Osceola.*

Osh′kosh, Wis., the county seat of Winnebago County, is situated at the confluence of the upper Fox and Lake Winnebago in a thickly-settled and fertile region. Being naturally the center of the lumber interests of Fox and Wolf Rivers, it early became commercially important, and now has a population of 33,062. Besides its numerous sawmills, it is noted for its extensive manufactures of sash, doors, blinds, matches, carriages, sleighs, farm wagons, trunks, furniture, agricultural implements, flour, tools for logging, grass-twine goods and canned goods. It has fine public schools and churches, several large parochial schools, a state normal school, a state fish hatchery, and three miles north are the northern state hospital for the insane, a county hospital for the incurable insane and the county almshouse. The city has three hospitals, four parks, a beautiful library building of classic design, six banks, one daily paper, three railroads, a line of steamers for lake and river commerce and an electric railway system connecting the city with Neenah, Menasha, Appleton and other places. Near by is Lake Winnebago, 30 miles long and 12 broad, famous for fishing and for beautiful summer resorts.

O′sier. See WILLOW.

Osiris (*ô-sī′rĭs*), the greatest of Egyptian gods, is the son of Set (the earth) and Nut (heaven). He was slain by Set, his father, and avenged by his son, Horus. He judges the dead in the lower world. He is represented usually in human form, and always with the head of a man. His symbols are the evergreen and the tamarisk, and a kind of ibis, with long plumes. See HORUS, ISIS and SET.

Os′kaloo′sa, Ia., county-seat' of Mahaska County, on the Chicago Burlington and Quincy; Chicago, Rock Island and Pacific; and Iowa Central railroads, about 60 miles southeast of Des Moines. It is a commercial center of a large agricultural district, and has a number of manufacturing interests. It has good public schools, a public library and churches. It also is a seat of three colleges, namely, Penn College, which is under the auspices of the Society of Friends, Central Holiness University and Oskaloosa College. It was settled in 1843, and incorporated 10 years later. The population is 10,484.

Os'ler, William, M. D., LL. D., F. R. C. P., after 1904 Regius Professor of Medicine, Oxford University, England, a physician and clinician of acknowledged ability, author of several notable works on medical science. He was born at Bonehead, Ontario, July 12, 1849. He received his elementary education at Trinity College School, Port Hope, from which he passed Trinity University, Toronto, and then to McGill College, Montreal, where he graduated in 1872. He continued his studies at University College, London, England, and at Berlin and Vienna, paying special attention to physiology and pathology. On his return to Canada in 1874, Dr. Osler was elected to the chair of these subjects at McGill and here, as later in the United States, he had a brilliant professional career. In October, 1884, he was appointed to the chair of clinical medicine at the University of Pennsylvania, Philadelphia, passing thence, five years later, to Johns Hopkins, Baltimore, Md., to take the professorship of the principles and practice of medicine and to become physician to Johns Hopkins Hospital. His success as a teacher was marked by ability and enthusiasm, and these qualities gained him later his prominent position at Oxford, besides many high honorary degrees. Dr. Osler believed that the real work of life is usually done by man's fortieth year and that after the sixtieth year it would be best for the world and best for themselves, if men rested from their labors. His writings include (besides addresses on *Oliver Wendell Holmes* and on *Teacher and Student*) *The Principles and Practice of Medicine; Cerebral Palsies of Children; Lectures on Abdominal Tumors; Pectoris and Allied States; Chorea and Choreiform Affections; Cancer of the Stomach; Science and Immortality;* other addresses and *Counsels and Ideals*. Dr. Osler's Lectures and Published Works. He died Dec. 29, 1919.

Os'lo, capital of Norway, See CHRISTIANIA.

Osman Digna (*ŏs-män' dĭg'nȧ*), a leader of the Sudanese Arabs, was born at Suakim about 1836. His father and grandfather were slave-dealers; and the son followed the same calling, having marts for his slaves at Khartum and Berber on the upper Nile. He was the leader of the Sudanese in repeated outbreaks against the authority of the khedive, extending at intervals from 1881 to 1898, when at the battle of Omdurman his army was routed by Gen. Kitchener in command of the English and Egyptian forces, 11,000 Sudanese being slain. He was killed near Tokar in 1900.

Osman' Nubar, a Turkish general, was born at Tokat, Asia Minor, in 1832. He was educated at the military schools of Constantinople and became a cavalry officer. He fought in the Crimean War; took part in suppressing the rebellions in Syria (1860); in Crete (1867); and in Yemen (1874). He was commander of the fifth army corps in the Turkish army at the outbreak of the Russo-Turkish War in 1877; was commandant at Widdin; and, after being driven back from Scalevitze, he intrenched and maintained his army at Plevna almost four months, despite the fierce bombardment of the Russian forces. He was, however, forced to surrender, Dec. 10, 1878, at which time he still commanded 43,000 men. His sword was returned to him by the czar, and he was promoted by the sultan to be minister of war in 1878. He also was made governor of Crete. In 1894 he became grand marshal of the palace. He died at Constantinople, April 4, 1900.

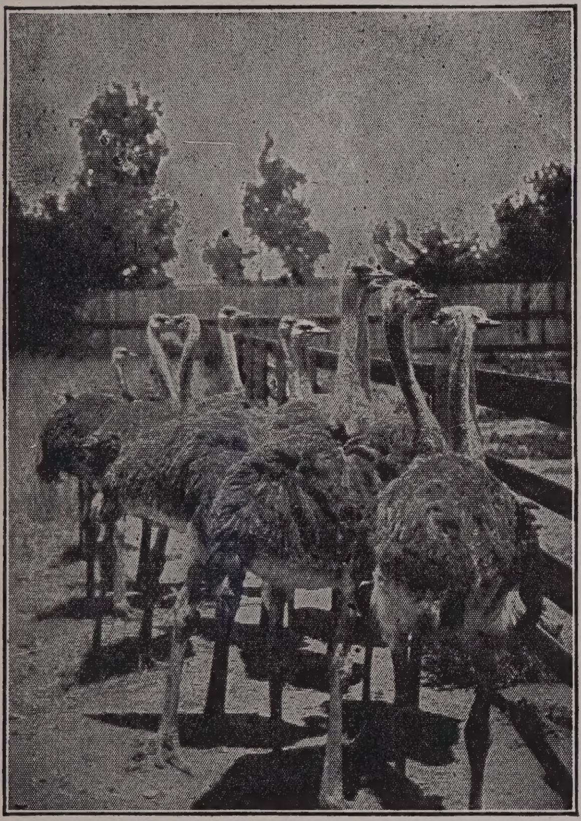
Os'prey. See FISH-HAWK.

Ossian (*ŏsh'ian*), the great Gaelic poet, was, according to tradition, the son of Fionn MacCumhail, who lived in the 3d century A. D. Fionn gathered a band of warriors about him whose adventures constitute the literature of the Feinn. Ossian is said to have been carried away to the "isle of the ever-young," and when he returned, old and blind, to have told these stories of the Feinn. Ossian is best known through the work of James MacPherson, who in 1760, 1762 and 1763 published *Fingal*, a poem in six books; *Temora*, another poem, in eight books; and some shorter pieces, all claiming to be translations of Ossian, the son of Fionn or Fingal. They brought him fame and wealth, and were translated into nearly every European language, Goethe, Schiller and Napoleon being among his admirers. But Dr. Johnson, with others, attacked them as forgeries, claiming that there was no Gaelic literature as ancient as the original of Fingal claimed to be. The truth seems to be that these translations were largely the work of MacPherson, and the Gaelic texts were prepared with or without the aid of his friends, but the heroic literature of the Gael on which his work was founded remains. See *Ossian* by Clerk and *Reliques of Gaelic Poetry* by Brooke.

Ostend (*ŏst-ĕnd'*), a watering place in Belgium, on the German Ocean, 77 miles northwest of Brussels. Its sea-wall, 3 miles long, 40 feet high and 105 feet broad, forms a fine promenade, and two wooden piers projecting on both sides of the harbor are used for the same purpose. It is the resort from July to September of 20,000 to 25,000 visitors from all parts of Europe. It is an important fishing-station, has a school of navigation, a lighthouse and manufactories of linen, sailcloth, candles and tobacco. It dates from 1072; was besieged by the Spaniards from July 7, 1601, to Sept. 20, 1604; surrendered to the allies in 1706 and to the French in 1745. Since 1865 it has been without fortifications. Population 41,698.

Osteopathy (*ŏs-tē-ŏp'ȧ-thy̆*), a system of treating diseases by manipulation, which was invented by Dr. A. T. Sill, then of Baldwin, Kan., but later of Kirksville, Mo., where a large school has been founded. The system takes its name from the theory that all diseases are "caused by some displacement of some bone which causes obstruction to the flow of one of the fluids." This trouble it is sought to remove by manipulation of the parts affected, permitting the "free operation of the fluids of the body," in which, it is asserted, all medicinal virtues by nature inhere. Special legislation in several western states permits the graduates of osteopathic schools to practice as licensed physicians.

Os'trich, the largest living bird, a native of the plains and deserts of Africa. The wings are small and not adapted for flight, but the bird is a swift runner. It is said to go at the rate of a mile a minute with a stride, when under full speed, of twenty-two to twenty-eight feet. The male ostrich reaches a height of seven feet and weighs from one hundred and fifty to two hundred pounds. It is called the camel-bird. The male has black feathers on the body, and white ones on the wings and tail. The latter are the plumes of greatest value. The female is plainer. The head and neck are unfeathered in both. There are three species of ostriches in Africa, they live in small flocks and are timid and difficult to approach. They are hunted on horseback, and advantage is taken of the fact that they run in a circle. About ten eggs are laid in a hole in the sand, and sat upon by the male at night and by the female by day. These eggs are from five and one-half to six inches in longest diameter, and are equivalent to about twenty-four eggs of the common fowl. The shell is so thick and strong that it has been used as a water-vessel by South African tribes. In their native haunts ostriches feed on grass, herbs, insects and reptiles, but in captivity they swallow nearly everything not too large. Ostrich-farming is now carried on in Cape Colony, Australia, Buenos Ayres, the United States and other places where the African ostrich has been introduced. Great progress in ostrich-farming has been made in the last five years, in Arizona, California, Florida and Arkansas. The birds thrive on alfalfa, and where this pasturage is plentiful they have attained a larger growth than those imported from Africa, reaching a weight of 375 pounds and a height of 8 or even 10 feet. The female seldom lays a fertile egg until she is 3½ years old. The nest is a round hole in the ground, which the male scoops out with his feet. At first the female may lay her eggs on the ground, and the male will roll them into the nest. Incubators are used successfully in hatching the eggs, the period of incubation being 42 days. The ostrich is plucked for the first time when six months old, and should be plucked about every eight months thereafter during its life-time. The only feathers removed are those of the wings and tail. The ostrich is a long-lived bird. It is claimed by some writers that they live to be a hundred years old. Some which are known to be forty years old are still breeding and producing feathers. Ostriches pair at four years and are then worth about $800 per pair. The yield of fea hers is about one and a half pounds yearly, worth $20 per pound. Consult Douglass: *Ostrich-Farming in South Africa;* Martin: *Home-Life on an Ostrich-Farm;* and *Year Book* of the Department of Agriculture (1905).

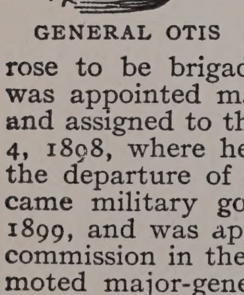


YOUNG OSTRICHES — CALIFORNIA

Oswe'go, N. Y., a city on Lake Ontario, at the mouth of Oswego River, 35 miles from Syracuse. It is divided by the river, which is crossed by three bridges, and has five miles of water frontage on the river and two and a half miles on the lake. It is the chief port on the lake, with a breakwater and lighthouse, and has five miles of wharves. Fort Ontario guards the harbor. This fort was rebuilt in 1905 at a cost of nearly half a million, and was made a four-company post. The city is built on slopes rising to 100 feet, and the shore of the lake is a bluff from 40 to 50 feet in height. The public buildings include the court house, city hall, state armory and public library. The river has a fall of 34 feet within the city, which is used as water-power for flour mills, knitting mills, foundries and iron works and for making steam shovels, dredges and steam engines, there also are woolen factories, one of the Diamond Match Co.'s factories, a Standard-Oil box-factory and a factory for making corn-starch which is one of the largest in the country, covering more than four acres. Oswego is one of the largest shipping-points on the Great Lakes for anthracite. The state normal school is located here. Oswego was a trading post of the English in 1720, and in 1727 a fort was built. It was taken by the French in 1756 and by the British in 1812. It became a city in 1848. Population 23,368.

Othel'lo, one of Shakespeare's four supreme masterpieces in tragedy, was perhaps written in 1604. Published in 1622 in quarto, in 1623 it appeared in the famous first folio. The alternative title of the drama is *The Moor of Venice.* The basis of the plot was adopted by Shakspere from an Italian novel entitled *Un Capitano Moro.* The tragedy deals with the love and jealousy of Othello, a so-called Moor, who wins the love of the fair Venetian maiden Desdemona by his qualities of heart and head and his strange tales of adventure by flood and field. The villain, Iago, plays upon the jealousy of the otherwise great-hearted man, until, believing his wife to be false, Othello slays her and dies by his own hand.

O'tho I or **Ot'to the Great** was born in 912. He was the son of Henry I, emperor of Germany, and succeeded his father in 936. His reign was very successful; many tribes were brought by him into subjection; he held almost supreme power in Italy, both over the kings of Lombardy and the popes of Rome; he consolidated the German empire; and he established Christianity in Scandinavian and in Slavonic lands. He died in Prussian Saxony in 973.



GENERAL OTIS

O'tis, Elwell Stephen, an American soldier, was born at Frederick, Md., March 25, 1838. He studied law at Harvard and graduated in 1861. On Sept. 13, 1862, he entered the volunteer army as a captain (140th N. Y.), and was mustered out in June, 1865, as brevet brigadier-general "for distinguished services." He was appointed lieutenant-colonel in the regular army, July 28, 1866, and rose to be brigadier, Nov. 28, 1893. He was appointed major-general of volunteers and assigned to the Philippine Islands, May 4, 1898, where he took chief command on the departure of General Merritt. He became military governor of the islands in 1899, and was appointed on the Philippine commission in the same year. He was promoted major-general in the regular army, January, 1900. General Otis was a famous Indian fighter during 1867-81, and published *The Indian Question* in 1878.

Otis, Harrison Gray, an American statesman, was born at Boston, Mass., Oct. 8, 1765. He studied at Harvard College, and was admitted to the bar in 1786. Sent to the legislature in 1796, he soon became leader of the Federal party. He was one of three commissioners sent in 1814 by Massachusetts to Washington to present to the government the subject of the damages inflicted on New England by the war with Great Britain. As United States senator in 1820, in the debate on the Missouri question, he strongly favored the restriction of slavery. He was a popular orator, and opposed the antislavery movement in his later years. He died at Boston, Oct. 28, 1848.

Otis, James, an American statesman and orator, was born at West Barnstable, Mass., Feb. 5, 1725. He studied at Harvard and at Boston, was admitted to the bar at Plymouth in 1748, and moved to Boston in 1750. In 1760, when advocate-general, the revenue officers asked his aid in obtaining search warrants from the superior courts by which they could enter any man's house in search of smuggled goods. Otis considered this illegal and refused, resigning his position and appearing on behalf of the people. His speech on the subject lasted five hours, and made a great impression, John Adams saying of it afterwards: "The child Independence was then and there born." He was elected to the assembly, and was a delegate to the Stamp Act congress, which met in New York the same year; and a member of a committee of that body to prepare an address to the English house of commons. While in the Massachusetts legislature, the governor requested that a letter on relief from taxation, sent to the other colonies, be taken back by the legislature. Otis opposed the governor's requisition in a speech called by his opponents "the most treasonable declaration ever uttered," and carried the house 92 to 17. He was severely beaten by some revenue officers in Boston in 1769, and lost his reason as a consequence of a sword cut on his head. He published several political pamphlets, *The Rights of the Colonies Asserted* being the best known. He was killed by lightning on May 23, 1783, while standing at the door of his home at Andover, Mass. See *Life* by Tudor.

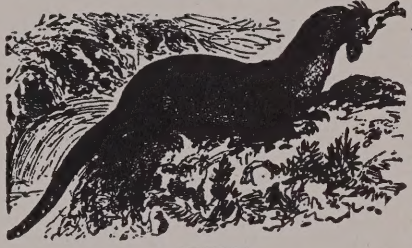
Ot'tawa, Ont., capital of the Dominion of Canada, is on Ottawa River, 87 miles west of its junction with the St. Lawrence. Population, by the last census, 86,106. The New York Central has a terminus in Ottawa with a direct line to New York. The Grand Trunk and Canadian Pacific furnish excellent connections in all directions. There are four direct lines of road to Montreal. The city is well-known as the center and distributing point of an immense lumber-area. Some of its wealthiest citizens have made their fortunes in the lumber-trade. Its water-power facilities are unexcelled. Within the city a great amount of power is immediately available and is attracting a large variety of industries. Rideau Hall, the official residence of the governor-general, is in Ottawa. Its electric street-railway service is one of the best in Canada. Its educational facilities are admirable. One of the provincial normal schools of Ontario for training teachers is located here. Ottawa has a large French population. The parliament buildings are imposing.

Ottawa, Ill., capital of La Salle County, at the junction of Illinois and Fox Rivers, in northern-central Illinois, 82 miles southwest of Chicago. It is situated in a rich region, and has a considerable trade in shipping grain, lumber and produce; besides manufacturing industries, which include plate and opalescent glass, glass bottles, electric-light bulbs, lamp-chimneys, pottery, tile roofing, drain tile, sewer pipe, firebrick, carriages, wagons, organs, saddlery and harness, agricultural implements etc., cream separators and pianos, Ottawa operates three sand-works, which prepare sand for glassmaking, and one which ships molder's sand — that is, the article as it is obtained. Ottawa's prominent buildings are Ryburn Memorial Hospital and Illinois Appellate Court etc. The city has excellent public schools, fine parochial schools and a high school library, besides Reddick and Odd Fellows' libraries. Has city ownership of its lighting and waterworks system. Population 12,000.

Ottawa River, Can., the depth of which at Grenville is from six to 15 feet, receives numerous rivers and falls into the St. Lawrence. In its course the river forms picturesque rapids and magnificent lakes. The water-power of the Long Sault is estimated at 20,681 horse-power. The Ottawa rises in western Quebec, flows west to Lake Temiskaming, thence southeasterly, separating Quebec from Ontario, and joins the St. Lawrence after a course of 750 miles. Chaudiere Falls at Ottawa are grand. It is navigable for steamers as far as Ottawa, 87 miles up.

Ottawa, University of, was established in 1848 by Joseph Eugéne Guiges, first bishop of Ottawa. In 1889 it was by Pope Leo raised to a Catholic University with power to confer degrees. It was intended to have the same position in Ontario as Laval University in Quebec. It has a valuable museum of natural history. The attendance of students averages about 500. The present archbishop of Ottawa and the bishop of Alexandria were among its first students. The theological and the arts' course each cover four years. There are courses in law and engineering. Archbishop Duhamel of Ottawa is Chancellor. Nearly all the professors belong to the Oblates. Amongst its graduates are not a few distinguished men.

Ottawas, a tribe of American Indians of the Algonquin family, living, when first found by the French explorers, in the northern part of Michigan. They fled from the Iroquois beyond the Mississippi, to the country of the Sioux, and after war with them went back to Mackinaw. They joined with the French, and after the settlement of Detroit a part of the tribe lived near it. At the close of the last war of the French for Canada, their chief, Pontiac, headed a great conspiracy against the English. In the Revolutionary War, they helped the English, but finally joined in the Indian treaty of Greenville, Aug. 3, 1795. A band of them settled on the Miami River, and when their land was ceded to the United States, a tract 34 miles square was reserved to them on the Miami. Other bands have taken up lands in the Indian Territory, while some are still found on the shores of Lake Superior and in Canada.


OTTER

Ot'ter, an aquatic carnivorous animal related to the weasel, and highly valued on account of its fur. Otters inhabit both the Old and the New World. They have an elongated, low body, with short limbs and webbed feet. They are seal-like in appearance, the color a seal-brown, brighter below than above. The common otter of Europe is similar in form to the American otter, but shorter, being about two feet long without the tail. The American otter is from three and a half to four feet long. It is found occasionally in Florida and the Carolinas, in portions of the Rocky Mountain region and from British Columbia to Central Alaska, but is rare. Otters are fond of sliding down slopes into the water; in winter they slide on the snow and enjoy coasting as well as a schoolboy. Among themselves they are playful and affectionate, are gentle and easily tamed. They feed almost exclusively on fish. They are expert swimmers and divers and readily overtake fish, which they bring to shore to devour. In certain parts of India and China the otter is taught to catch fish and assist in driving them into nets. It is said that when fishing is poor, otters sometimes resort to land-hunting. When disturbed with their young by an inquisitive dog, they have little trouble in defending themselves. They take excellent care of their offspring, the young usually numbering two. The dens generally are near water with the entrance under the water; sometimes a nest is found under a hollow tree, again in a cave well up a bank. The sea-otter is a related form but belongs to another genus. It is a true child of the ocean; "born at sea, on a bed of kelp, and literally rocked in the cradle of the deep." It is one of the most valuable of fur-bearing animals — a single skin will bring over a thousand dollars. It was once abundant in the Pacific from California northward, but now is very rare save about the Aleutian Islands, where at this late day it receives rigorous protection. It is about four feet long, its fine dense fur of a lustrous black. See Hornaday: *American Natural History;* Stone and Cram: *American Animals.*

Ot′terburn, Battle of, "the hardest and most obstinate battle ever fought," according to Froissart, took place near Otterburn, a small village in Northumberland, England, about 16 miles south of the Scottish border and 32 from Newcastle. Douglas, with his Scottish army, carried away Hotspur's pennon from Newcastle, saying that he would plant it on his own castle. "You shall not carry it out of Northumberland," swore Hotspur (Harry Percy). So the Scots encamped on a slope near Otterburn to give him time to regain his pennon. Hotspur, with 8,600 men, nearly four times the bulk of the Scotch force, attacked their camp. Douglas, hewing the way before him with his mace, fell mortally wounded, anxious only to hide his death from his followers till they had won the victory, saying: "Long since I heard a prophecy that a dead man should win a field, and I hope in God it shall be I." The Scots gained the day, taking Harry Hotspur and his brother prisoners. The date of the battle is Aug. 19, 1388. The Scotch ballad of *Otterburn* and the English ballad of *Chevy Chase* tell the story of this battle. See White's *History of the Battle of Otterburn* and Percy's *Reliques.* See BALLADS and CHEVY CHASE and PERCY.

Ot′toman Empire. See TURKEY.

Ottum′wa, Ia., county-seat of Wapello County, is on Des Moines River, 85 miles southeast of Des Moines. Surrounded by a fertile country, it manufactures agricultural implements, mining tools, iron and steel specialties, meat products, cigars, steel bridges and confectionery. The city boasts of 40 churches, 14 schools, 10 banks and 100 factories. It is served by four railroads, and is in the heart of Iowa's coal fields. Population, 25,000.

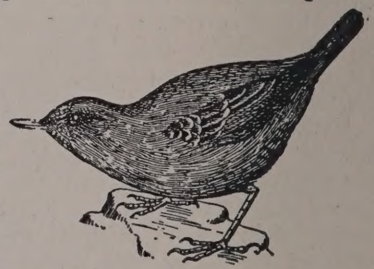
Oudenarde (*ou′den-är′de*), a town in Belgium on the Scheldt, 33 miles west of Brussels. It is noted as the scene of a famous battle, brought on by the efforts of the French to retake the city from Marlborough, who had captured it in 1706. It was the third of Marlborough's four great victories, and was gained on July 11, 1708.

Oudinot (*ōō′dē̆′nō̆′*), **Nicolas Charles,** duke of Reggio and marshal of France, was born at Bar-le Duc, France, April 25, 1767. He was made commander of ten battalions, which became famous as Oudinot's grenadiers. He was at Austerlitz and Jena, and won the battle of Ostrolenka, Feb. 18, 1807. For his brilliant services in the Austrian campaign of 1809 he was made marshal of France and duke of Reggio. He was one of the last to leave Napoleon, but left him entirely, remaining on his estates during the Hundred Days. He was made minister of state, commander of the royal guard and a peer of France after the second restoration. He died at Paris, Sept. 13, 1847. See *Napoleon and His Marshals* by Headley.

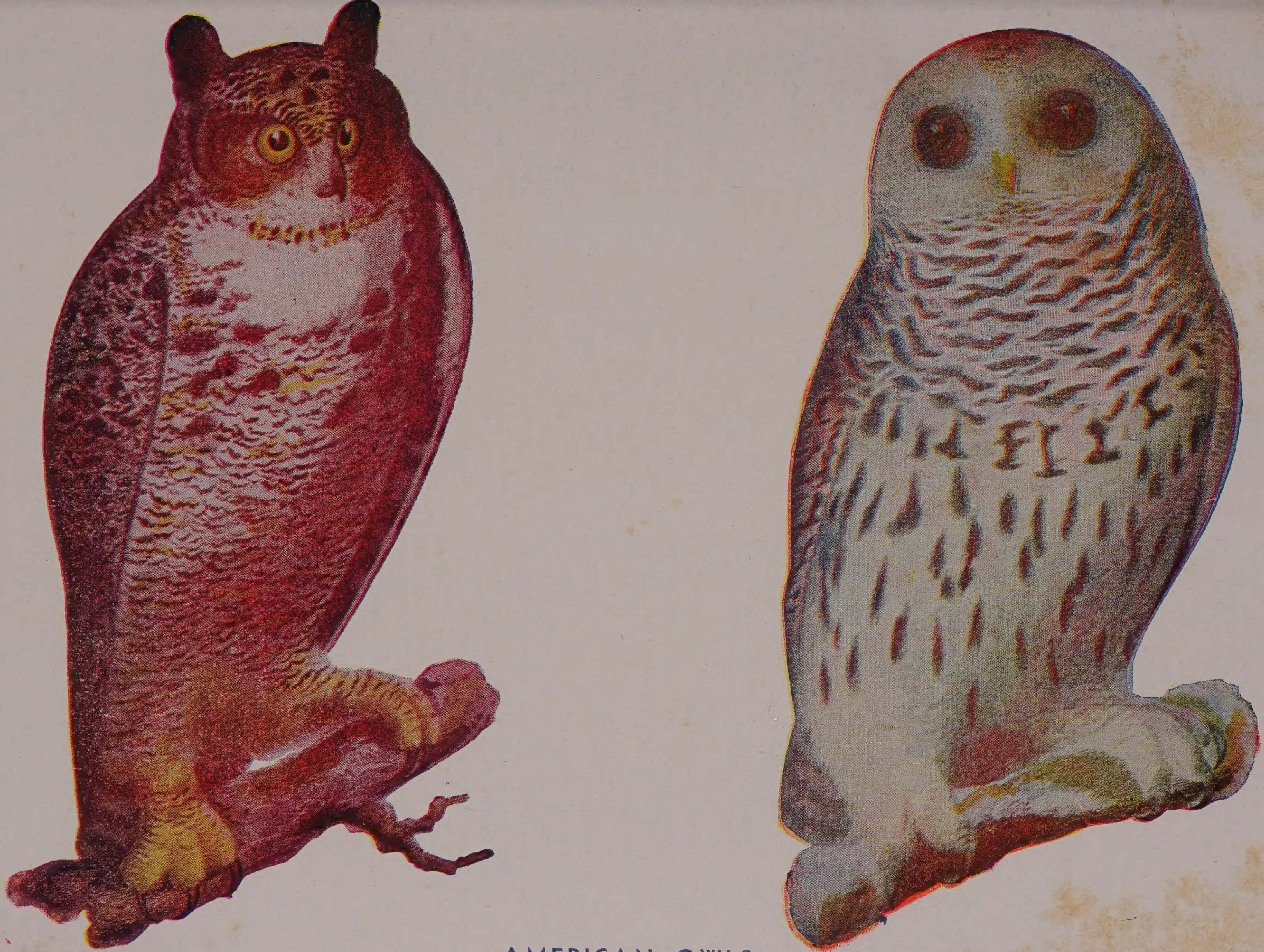
Ouida. See RAMÉE, LOUISE DE LA.

Our Mutual Friend is a novel by Charles Dickens, first published in serial form and, with the last serial number in November of 1865, in book form. It is a story of London life in which some 50 characters are delineated. The story divides itself into three parts, in which John Harmon, Lizzie Hexam and Eugene Wrayburn, her lover, and two adventurers Mr. and Mrs. Lammle, are the respective centers of interest. These parts are connected by Mr. and Mrs. Boffin, the servants of John Harmon's father. The father is an eccentric old man, who, disinheriting his son, makes the Boffins his heirs. The son, after concealing his whereabouts for years, secures employment under the name of John Rokesmith as Mr. Boffin's secretary, who styles him Our Mutual Friend. In time he is recognized by Mr. Boffin who graciously turns his estate back to him.

Ou′zel, a popular name given to several birds, mostly of the thrush (*Merulidæ*) family. In Shakespeare and in Tennyson the blackbird is called an ouzel, but in America the name is for the most part restricted to small birds which look like land-birds but are aquatic in their habits. The American water-ouzel resembles a catbird in appearance, is solitary in its habits, and lives along the banks of dashing streams. It will surprise the spectator by dropping suddenly into a brawling mountain cataract, and then appear swimming along through the pools by the use of its wings or, it may be, running swiftly along the bottom. Its food is composed of small mollusks or aquatic insects and their larvæ, which it seeks among the stones at the bottom.


OUZEL

O′vary (in plants), the name of that bulbous part of carpels or pistils which contains



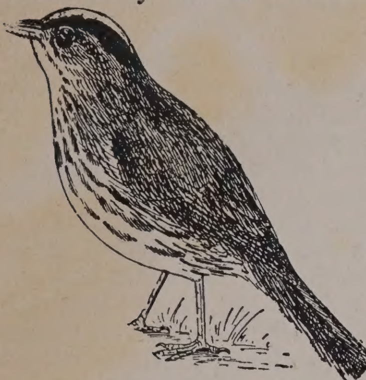
Great Horned Owl

AMERICAN OWLS

Barred Owl

the ovules. As the term ovary is already well-established among animals in connection with the organ which produces eggs, its present application in flowers is extremely unfortunate, since the ovary of flowers holds no relation to a female sex-organ. It has been suggested on this account that the term ovulary be substituted for it in flowers. See FLOWERS.

Ov'en-Bird', a small bird but burdened with many names — teacher bird, golden-crowned thrush, golden-crowned wagtail, wood wagtail, etc. etc. It is a wood-warbler, spends most of its time on the ground or in undergrowth. It is shyest of the shy, its call of "teacher, *teacher*, TEACHER, TEACHER, TEACHER, TEACHER" better known than the manner of its appearance. Very rarely heard, but rarest treat to him that hears, is its flight-song of the nesting season; an inspired, joyous warbling that the little bird pours forth from tree-top. It is smaller than the English sparrow, upper part of the body olive-colored, crown a golden-brown, underneath white, breast spotted. It is widely distributed in the United States, migrates in May and October, its preferred habitat dry woods. The nest is not easily found, so artfully fashioned and made to look a part of the leaf-covered ground; in form resembling an old-time Dutch oven, roofed over, the entrance not at the top but at the side, the structure of leaves, grasses, rootlets and weed-stalks. The creamy-white eggs are speckled, and number four or five.



OVEN-BIRD

O'verbeck, Friedrich Johann, a noted German painter, was born at Lübeck, Prussia, in 1789, and studied at Vienna and at Rome. He, with four others, founded a school of art that had much influence in Europe, though mocked at with such names as Pre-Raphaelites and Nazarites. A madonna, painted in 1811, brought Overbeck into notice, and he was employed by the Prussian consul to execute frescoes in his house at Rome illustrating the story of Joseph. His chief work is *The Vision of St. Francis*, a fresco at Assisi. Among his famous pictures are *Christ's Entry into Jerusalem*, at Lübeck; *Christ's Agony in the Garden*, at Hamburg; *The Incredulity of St. Thomas*, at London. Many of his drawings, as well as of his paintings and frescoes, have been engraved. He died at Rome, Nov. 12, 1869. See *Life* by Atkinson in the Great Artists Series.

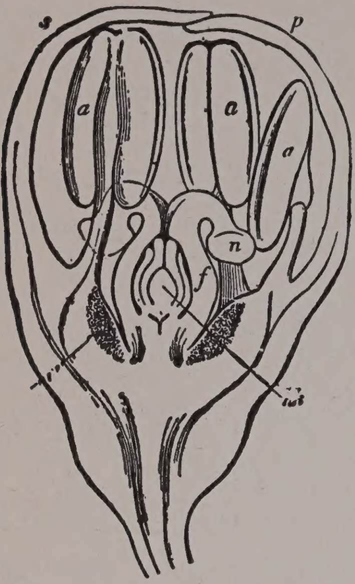
O'vertones', sometimes called harmonics, are a series of weak tones which accompany the production of any given note on a musical instrument. The lowest string on a guitar is called an E string, because, when plucked, the lowest and the loudest note which it can emit is E. This note, E, is, therefore, called the fundamental. If we denote the number of vibrations per second in this fundamental note by unity, then the series of fainter notes, which accompany the fundamental whenever the string is plucked, will have frequencies which are denoted by the numbers 2, 3, 4, 5, 6, 7, etc. These secondary notes are called overtones or harmonics. They are very marked in the case of stringed instruments provided with sounding boards (such as the piano and violin), and add greatly to the richness of the tone. They are nearly absent in the case of the tuning fork, and hence the pure but thin tone of the fork. See MUSICAL NOTATION.

Ov'id (Publius Ovidius Naso), the Latin poet, was born in Sulmo, Italy, March 20, 43 B. C. He was educated at home, his father putting him under the best of teachers to train him for the bar. He soon gave up the practice of law and went to Athens, Asia Minor and Sicily. His first success was won by his tragedy of *Medea*. Then followed his *Epistles*, imaginary love-letters. His *Art of Love*, his masterpiece, was published in three books. The *Metamorphoses*, in 15 books, contain some of the finest work in ancient literature The *Fasti*, only six books of which were finished, are a poetical commentary on the calendar, giving the origin of Roman feast-days. He was banished by Emperor Augustus to Tomi (Kustendje) on the Euxine, south of the mouth of the Danube, for some unknown offense. He admitted that the punishment was deserved, but says he was rather the witness than the author of the crime. In 9 A D. he left Rome, making his home for the last eight years of his life at Tomi constantly writing appeals to the emperor for a release from the sentence of banishment. Here he wrote the *Tristia* in five books and *Letters* in four, making him one of the most prolific of Latin poets. He died in 17 A D.

O'vulary. See OVARY.

O'vule (in plants), the peculiar megasporangium of seed-plants, which in gymnosperms is exposed upon a scale, and in angiosperms is inclosed within that part of the carpel called the ovary. It is the ovule which, after fertilization, becomes the seed. The ordinary ovule consists of the following parts: one or two integuments, which are distinguishable only above and leave a narrow passageway (micropyle) through which the pollen tube passes; and the nucellus or main body of the ovule, inclosed by the integuments, and containing the single large megaspore (embryo-sac). Ovules are of various sizes, and occur in various numbers in ovaries, from solitary to almost innumerable. Various modifications of ovules have received technical names, which are of no special value to the general student.

See EMBRYO-SAC; INTEGUMENT; NUCELLUS.



Vertical section of a flower-bud, showing sepals (*s*), stamens (*a*), and an ovule (*kk*) with two integuments.

Owatonna (*ō-wȧ-tŏn′ȧ*), a city, and the seat of Steel County, Minnesota, is situated on the Straight River, seventy-four miles west of Rochester. It is on three important railways, and three great highways. The city has eight parks, and a number of beautiful buildings, including Sacred Heart Academy, the public library, the high school building, and a State school for dependent and neglected children. It is in the center of the Minnesota dairy district and an important agricultural region. There are four large nurseries at Owatonna. Its chief manufactures include flour, foundry products, engines, farm implements, canned goods, soap, jewelry and patent medicines. The population in 1930 was 7,654.

Owego (*ō-we′gō*), a village and the seat of Tioga County, New York, is situated at the junction of Owego Creek and the Susquehanna River, 220 miles northwest of New York City. It is located at the very gateway of the picturesque Finger Lakes region, and is consequently a noted summer resort and an attractive residence district. Among its prominent buildings are St. Paul's Church, the Owego Free Academy and the Coburn Free Library. The village lies in the center of a rich farming and forest region, and has a large lumber trade, a number of creameries, and important manufacturing establishments. The chief industries include manufactures of structural steel, wagons, soap, silk gloves, flour, shoes and leather goods, furniture, cigars and concrete pipe. The population in 1930 was 4,742.

Owen (*ō′ĕn*) **Sir Richard,** a British naturalist, was born at Lancaster, England, on July 20, 1804. He studied medicine at Edinburgh and London, but soon began his work in zoölogy and comparative anatomy. In 1856 he became superintendent of the natural history department of the British museum. He visited Paris and made the acquaintance of Cuvier, with whose name his will always be connected in the science of zoölogy. Owen's researches in zoölogy number nearly 400, largely devoted to structure, and embracing every class of animals from a sponge to man. He produced important monographs on the pearly nautilus, the Venus flower-basket, king crab, the mudfish, anthropoid apes and many extinct birds and reptiles. Among his voluminous writings are: *Comparative Anatomy of Invertebrates, Comparative Anatomy and Physiology of Vertebrates, The Skeleton and the Teeth, History of British Fossils, Reptiles, Birds, Mammals.* He died on December 18, 1892.

Owen, Robert Latham, an American lawyer and legislator, was born at Lynchburg, Virginia, in 1856. He was graduated from Washington and Lee University in 1877, and began to practise law in Virginia, from where he removed to Oklahoma. In 1884 he became owner and editor of the *Indian Chieftain,* and from 1885 to 1889 served as United States Agent for the five civilized tribes of Oklahoma. He won a reputation as friend of the Indians, recovering nearly $9,000,000 from the United States government for them. He drafted a bill in 1891 which later became a law, granting citizenship to the Indians. He became active in politics in 1892, and for the next four years was a member of the Democratic National Committee, of which he became vice chairman in 1906. In 1907 he was elected to the United States Senate, and reelected in 1913 and 1919. He helped to frame the famous Glass-Owen Currency Act, which created a regional reserve banking system.

Owen, Ruth Bryan, the first woman in the United States to hold the rank of Foreign Minister in the American Diplomatic Service, was born at Jacksonville, Illinois on October 2, 1885. The talented daughter of William Jennings and Mary Elizabeth Baird Bryan was educated at Monticello Seminary at Godfrey, Illinois, and the University of Nebraska.

During the World War, Mrs. Owen served as a volunteer nurse in the British Army under General Allenby in the Egyptian-Palestine campaign. In 1919, after the close of the war, she became a Lyceum and Chautauqua lecturer, continuing in that work until 1928. She was granted an LLD degree from Rollins College at Winter Park, Florida. She acted as vice president of the Board of Regents of the University of Miami from 1925-28, and was a member of the faculty of that institution from 1926-28. In 1929 she became a member of the 71st Congress, Democratic member of the United States House of Representatives for the fourth District of Florida. She remained a member of the House of Representatives until 1933. In 1931 she was awarded the degree of Doctor of Humane Letters from Russell Sage College. In 1933, she was appointed by President Roosevelt to the diplomatic post of "envoy extraordinary and minister plenipotentiary to Denmark," residing in Copenhagen. Ruth Bryan is the author of *Elements of Public Speaking* (1931).

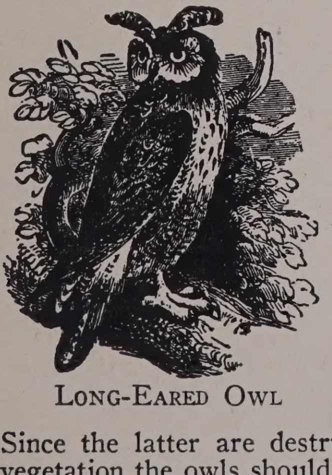
Owen Sound, a town and port of Grey County, Ontario, Canada, is situated on Lake

Huron, 120 miles northwest of Toronto. It is a terminus of branches of the Canadian Pacific and the Grand Trunk railways. It has an excellent harbor. Canadian Pacific boats leave twice a week for Sault Sainte Marie and Fort William. The gas and electric light plants are owned by the city. The chief industries include iron and wood-working, cement manufacture, lumber and woolen products. The city has several grain elevators. The population in 1931 was 12,839.

Owens, Robert Bowie, an American electrical engineer and inventor, was born in Anne Arundel County, Maryland, in 1870. He is famed for his discovery of the Alpha ray, and also for the invention of an electrical accelerometer, and radio direction finding. Owens served in the World War, where he became successively a major in the signal corps, chief of the intelligence division, and was given charge of personnel, and finally became chief signal officer, with headquarters in London.

Owensboro (*ō′ĕnz-bŭr-ō*), a city and the seat of Daviess County, is situated in northwestern Kentucky on the Ohio River, 114 miles southwest of Louisville. The city is served by three railways, and several steamboat lines which connect it with the Mississippi. It is located in a fertile agricultural and mineral region. The city has four beautiful parks. Notable buildings include the Federal Building, Court House, Carnegie Library, St. Frances Academy and the Mary Kendall Home. The mineral products of the region include coal, clay, building stone, iron, zinc and lead. The trade in coal and clay is especially extensive. Much of the nearby land is wooded, and timber products are important. Owensboro is one of the largest leaf and strip tobacco markets in the United States. Other industries of importance include foundries, planing and flour mills, furniture manufacture, vehicles, brick, wheels, and ditcher and grader works. The city has the commission form of government. In 1930 the population was 22,765.

Owl, a bird of prey with a flat face and rosette of feathers about the eyes, making them appear large and conspicuous. There are about 200 species. For the most part they are birds of night and pass the day in secluded and dark places. A few, like the snowy owl and the hawk-owl, are day-birds. The common owls feed for the most part on smaller birds and field-mice. Since the latter are destructive to crops and vegetation the owls should be protected, if for no other reason than for their war upon these rodents. Preying at night, in their soft plumage flitting about silently, they dispose of animals that have hid by day from the hawk. Owls feed upon field-mice, rats, squirrels, fish, insects and other animal food, eating their prey entire; later the indigestible parts, rolled into a hard pellet, are ejected from the mouth, and these pellets are found in numbers about roosting-spots. Owls generally live in woods, and are seldom tamed. They fall ready prey to man, being easily trapped and shot, and their nests as a rule are openly exposed. They nest early, their young being fed on animal food instead of fruit. Their eggs are always pure white. The cry of the owl is well-known. When angry or frightened the bird strikes its mandibles together like castanets. The barn owls form a distinct family. They have long faces, the feather discs on which are nearly triangular, and they are often called monkey-faced owls. The familiar barn-owl seldom molests birds, is the enemy of rats, and should be given all protection. In color it is pale brownish-yellow, and it is of peculiar shape with legs long as compared to owls generally. It is less fluffy, its eyes are small and black, the face is outlined by a dark ring. It seeks shelter under roofs made by man, and is not infrequently found in a church-belfry. This owl is very widely distributed.



LONG-EARED OWL

There are about eighteen species of owls in North America; varying in size from the six-inch elf owl of Arizona to the great gray owl of the Arctic—over two feet in length. The latter bird, while always rare in the United States, is occasionally seen as far south as the Ohio River. There are four of the so-called horned owls; the long-eared, short-eared, great-horned and the screech-owl. The great-horned is a large, fierce member of the family, and does much to give the family as a whole a bad name. It steals all kinds of poultry, turkey included, and preys on game-birds and other birds. But mention should be made of the fact that it devours also mice, rats, gophers and numerous other destructive mammals. In appearance it is quite splendid—of noble size; the abundant plumage a combination of brown, black, yellow and white, fine black bars across the breast; a distinguishing mark the large "horns." It belongs to wilder, heavily-wooded portions of the country, and in some localities is known as the hoot-owl. Perhaps the commonest in this country is the screech-owl, which nests about houses and is very widely distributed. It is quiet during the nesting season, but after the young are reared, in July and August, its voice may be heard at night—not a screech, but a tremulous, quavering sound of mournful quality. This is a small, round-bodied owl, not much longer than broad; it is sometimes black and white, grayish in appearance; sometimes reddish and white. It has noticeable horns. It eats sparrows and other birds, but destroys large numbers of mice, grasshoppers, locusts, cut-worms, beetles, caterpillars, crickets, lizards, frogs and crawfish. Hornaday recommends that the bird's numbers be limited, but that the bird be not exterminated. The long-eared in coloring resembles the great-horned, but is much smaller, and its very conspicuous ear-tufts stand on top of its head. This bird is very widely distributed in the United States, a very useful bird and should be protected. The short-eared also is deserving of protection, is the same size as the preceding, in color brownish-yellow above and buff below. Probably the most common owl in this country next to the screech-owl is the barred owl, the one that calls from deep wood the ghostly "whoo-whoo-whoo?" With its fellows it will sometimes unite in concert of hoots, an occasional shriek intermingled, ending with laughter full as eerie as the rest of the performance. It is a large, heavily-built owl, its plumage light-colored barred with black. Although it devours the destructive small mammals, it is also destructive to poultry, game-birds and other birds. The snowy owl, a beautiful bird either pure white or barred with black, nests in the north and visits the United States in winter. It is a day owl. It feeds on fish, birds, and small mammals. The burrowing owl is a small western owl living in the holes of prairie dogs. It is a savage little creature, a great fighter, these owls frequently killing each other. They feed largely on grasshoppers, locusts, and other insects. Their color is mixed gray, their legs long and bare.

Owosso (*ō̇-wŏs'ō*), a city in Shiawassee County, Michigan, is situated on Shiawassee River, about thirty miles from Lansing. It is an agricultural region, but engages in considerable manufacturing. The industries of Owosso include carshops, sugar-works, a screen and door factory, furniture-factories, a casket factory and others of less importance. The city has admirable public schools and good buildings, a business college, a public library and several churches. The waterworks are owned and operated by the city, and it is served by three railroads. In 1930 the population was 14,496.

Oxalis (*ŏk'sȧ-lĭs*), a genus of shrubs and herbs, abounds in South America, North America and South Africa. The leaves usually are compound, generally digitate in shape, and grow alternately, although simple leaves are occasionally found. The seeds of the Oxalis genus are similar to capsules, and have a hard elastic covering, which bursts in such a way as to project the seed to a distance. The Oxalis shrubs are frequently grown for ornament in gardens, and especially as borders. Many of them have bulbous roots, and some are edible, such as the South American oca. There are said to be more than 200 species of Oxalis.

Oxford (*ŏks'fẽrd*), a municipal and parliamentary borough of England, the capital of Oxfordshire, the seat of the oldest English University, and the seat of the bishopric of Oxford, is situated at the confluence of the Cherwell River and the Isis, a tributary of the Thames. It is fifty-two miles northwest of London. The city has a separate history and a commercial importance of its own, in addition to its fame as the seat of Oxford University. It commands one of the chief fords of the Thames.

The old part of the city stands on the rectangle of land formed by the two rivers. The center of the town is called "Carfax" from the Latin *quadrifurcus,* meaning "four-forked," as four main streets run from it toward the four points of the compass. The main street is High Street, or "the High," a part of the London road, extending from Carfax to the Magdalen Bridge. The others are Queen Street, St. Aldgate's and Cornmarket. The city has many beautiful buildings of its own, in addition to those of the University. The Church of St. Michael with its Saxon tower was erected in part in 1070 by Robert d'Oigli, who also began the erection of St. Peter in the East and St. Cross. He built the present castle tower, as he was the Norman master of the Saxon fortress erected to close the ford. Among other beautiful churches are All Saints', St. Barnabus, St. Aloysius and St. Aldgate's. The Clarendon building, used for the Clarendon Press until 1830, is outstanding in its architectural design. The Indian Institute has a library and museum for the special use of the members of the Indian service and natives of India. The Godstow nunnery is in ruins. Oxford erected in 1841 a cross known as the Martyrs' Memorial, to the honor of Oxford martyrs, Ridley, Latimer and Cranmer. The city is the seat of Somerville Hall and Lady Margaret Hall, colleges for women; of Wycliffe Hall, a theological school, and Mansfield College, a Congregational divinity school.

The buildings of the University are outstandingly beautiful. They are best considered in connection with the various colleges to which they belong.

All Souls' College was founded in 1437 by Archbishop Chichele for the souls of all who had fallen in the French wars. This is a college of graduates, specializing in law and history. In the rear quadrangle is the great Codington Law Library.

Balliol College was founded in 1263 by the father of John de Balliol, king of Scotland, and has buildings dating from the fifteenth century and rich in history. Wycliffe and Jowett are among its noted masters, and the famed graduates include Southey, Swinburne, Matthew Arnold, Cardinal Manning, Archbishops Tait and Temple, H. H. Asquith, Lord Milner and Lord Curzon.

The Bodleian Library is situated just off Broad Street, next to the Sheldonian Theatre. It is the public library of the University of Oxford, whose name it bears. He gave it a large collection of valuable books. Other early benefactors were the Earl of Pembroke, Sir Thomas Roe, Sir Kenelm Digby, Robert Burton and Archbishop Land. More than 8,000 volumes of the famed John Selden library were secured for the Bodleian. The library is rich in British history source materials, Jewish literature and Biblical codices. Under the Copyright Act it is entitled to a copy of every book printed in Great Britain, and possesses hundreds of thousands of volumes, in addition to thousands of manuscripts.

Christ Church is one of the Oxford Colleges and also the diocese cathedral. The college was founded as "Cardinal's College" in 1525 by Cardinal Wolsey. In 1523 it was remodelled by King Henry VIII and given his name. Not until 1546 was it finally determined upon as Christ Church. Wolsey built the hall and the kitchen in 1529, and they surpass any similar building in all England in design and structure. The great bell of Osney Abbey was recast to form "Great Tom" which hangs in the entrance tower, finished in 1682. Christ Church is the largest of the colleges, and belongs particularly to the upper classes. Its graduates include eight of the ninteenth century Prime Ministers, Sir Philip Sidney, John Locke, Lord Mansfield, the Marquis Welles and John Ruskin.

Corpus Christi College was founded in 1516 by Richard Fox, for the learning of the Renaissance. Exeter College dates to 1314 when Walter de Stapledon, Bishop of Exeter, founded it. The buildings are now almost all modern, few of the old ones remaining. This is also true of Hertford College, founded in 1874 by T. C. Baring in the interests of the Church of England. In this college are united the traditions of two old halls, Hart and Magdalen.

Jesus College is Elizabethan, dating from 1571. The front is chiefly Elizabethan in architecture, the rest having been added during the seventeenth century. Jesus College has always been especially connected with Wales. Keble College, opened in 1870 in memory of John Keble, has a fascinating chapel of ornate design. It is set apart also in its government, having no fellows, and being governed by an outside council.

Magdalen College was founded in 1458 by William Waynflete, Bishop of Winchester. It possesses the finest buildings from an architectural standpoint, of any college in the world. The chapel, hall and cloisters are of fifteenth century workmanship. The great tower is the most beautiful and impressive sight in all Oxford. Viewed from the Cherwell, it rises behind the river and bridge and the great old trees, in utter grace and loveliness. This triumph of architecture was completed in 1507.

Manchester New College was removed to Oxford from London for the study of independent theology. Mansfield College was transferred to Oxford in 1886 and is the principal theological college of English nonconformists. Merton College was originally founded at Malden, Surrey, in 1264, and transferred to Oxford ten years later by Walter de Merton, Bishop of Rochester. It was the first organized college in the University and became the type for all the existing foundations in either Oxford or Cambridge.

New College dates to 1386, when William of Wykeham founded it. It has always been intimately connected with his school at Winchester. It is a magnificent group, many of the buildings dating from the time of its founder.

The present Oriel College is properly the College of St. Mary, and was founded in 1324. It has been much restored so that it actually dates from the seventeenth century. In the nineteenth century it was the center of the Oxford movement, during the time that Pusey, Keble and Newman were members of the college. Pembroke College, too, had formerly another name, Broadgates Hall, and was refounded in 1624. Most of the other buildings were added in the seventeenth century. Among its distinguished students were Dr. Johnson, Whitefield, and Blackstone.

Queen's College was founded in 1340 by Robert de Eglesfeld, who was chaplain to Queen Philippa. It has always been especially connected with the north country districts of England. St. John's College was founded by Sir Thomas White in 1555. The chapel hall, entrance tower, and a section of the street front of the outer quadrangle were a part of the former St. Bernard's College, built by the Cistercian monks in 1437-1530.

University College was endowed in 1249, the oldest date of any Oxford College. The first statutes were not received until 1280. Most of the buildings were erected in the first half of the seventeenth century. Shelley was the most famous member of the college. Wadham College, which was founded in 1610, has main buildings which have not been altered since the times of the founders. They are the best examples of Gothic architecture in Oxford. Sir Christopher Wren, the famous architect, was a student at Wadham.

Oxford, the town, is the market center for cattle. Its industries include brewing, printing, and automobile manufacturers. The Saxon Chronicle speaks of Oxford as early as 912 A. D. Empress Maud sought refuge there when Stephen of Blois drove her out of London in 1142. In 1258 the "mad Parliament" sat in Oxford and instigated the reform as the Provisions of Oxford. The city was a center of the fourteenth century movement begun by John Wycliffe, "the morning-star of the Reformation." During the seventeenth century it was a high church and loyalist center. Students were present in the twelfth century, and academic organization began in 1214. In the fourteenth century, Oxford was supreme among European universities as a center of scholastic philosophy and natural science. During the Reformation so much property was confiscated that Oxford was almost destroyed. Queen Elizabeth greatly restored it, and Archbishop Laud furthered its prestige. After the Reformation, it became obscure until the beginning of the nineteenth century. During the Civil War, Oxford for a few years was the seat of the parliament and court of Charles I. Population 53,000. See *Oxford City*, by Boase, in Historic Towns Series and *Oxford* by Lang.

Oxford, O., a town, 40 miles northwest of Cincinnati. It overlooks the beautiful Miami valley and has some manufactories of agricultural implements, but is best known as a college town. It is the seat of Miami University, founded in 1809, and noted for the high positions attained by its graduates. Western College for women (formerly called Western Female Seminary, a school modeled after Mt. Holyoke Seminary) and Oxford College are situated here. Population 2,017.

Oxford, Univer'sity of, one of the two great seats of learning in England situated at Oxford, is a collection of colleges under one corporation known as "the chancellor, masters and scholars of the University of Oxford." There are 22 colleges and three halls, to some one of which all members of the university belong. The teaching staff numbers about 100, with 3,500 students. Each college is a distinct institution with its own rules. The head of the university is the chancellor, who usually is chosen from the nobility, holds office for life, and receives no salary. The vice-chancellor, appointed by the chancellor, serves four years and is the real head. There are four governing bodies, called house of convocation, ancient house of congregation, modern house of congregation and the council. These bodies are made of college officers, professors, masters of art and resident graduates. The real management is in the hands of the council, consisting of the vice-chancellor, two proctors, who are the police officers of the university, six heads of houses, six professors and six graduates. The teaching in the colleges of the university is carried on by professors, lecturers and tutors. The professors do very little teaching, giving lectures perhaps twice a week and devoting their time largely to independent study. The college lecturers are the real teachers, but belong to the separate colleges, though their lectures are now open to the whole university. A large part of the work of the college course consists in taking papers, essays and translations to the tutors, who may be employed by individuals or by small classes.

Oxford, beginning in the early part of the 12th century, grew rapidly, its scholars being numbered by thousands as early as the 13th century. The four great orders of mendicant friars were attracted to Oxford, and established their schools in their convents, and were followed by other orders of monks. The Reformation, with the breaking up of the monasteries, destroyed half the glory of Oxford. The earliest college is Merton, founded in 1264 and transferred to Oxford in 1274, and the first institution organized into a college at Oxford, the earlier teachings having been carried on in halls. The old quadrangle and the library of Merton are among the most ancient college buildings in Oxford. Balliol, founded by the mother of John Balliol, king of Scotland, in 1268; Oriel, founded in 1326 by King Edward II; Queen's in 1340; All Souls' in 1347; and Jesus, founded in 1571 by Queen Elizabeth, are among the older colleges. Christ Church is the cathedral of the diocese of Oxford and also a college. The cathedral was instituted by Henry VIII in 1546, and the college founded by Wolsey in 1525. The entrance tower contains "Great Tom," one of the largest bells in England. The buildings of Magdalen (*mâd'lin*) College, founded in 1457, are thought to be the finest college-buildings in the world, and the musical services in its chapel have been famous for centuries. Other buildings connected with the university are the Bodleian, founded in 1602 by Thomas Bodley and now one of the largest libraries in the world; Radcliffe Library; Ashmolean Museum, the earliest public museum in England, containing British antiquities and some from Cyprus, Egypt etc.; Sheldonian Theater, built in 1669, for the ceremonies of the university; St. Mary's church, where are preached the university sermons; and the university observatory. The parks are the scene of most of the football games; and for a quarter of a mile along the river are moored the barges of the boat clubs. See *Tom Brown at Oxford* by Hughes and *Colleges of Oxford* by Clark.

Ox'us, the ancient name of a river in central Asia, now known as Jihun, Gihon and Amu Daria. It rises in the tablelands of Central Asia, flows through Bokhara and Khiva, and empties into the Sea of Aral. Its delta is 90 miles long, including many lakes and marshes. The river is used for irrigation mainly, though it has been ascended for 280 miles by steamboats. It is thought to have once flowed into the Caspian Sea, and to have twice changed its course since about 600 A. D. Its length is about 1,400 miles.

Ox'ygen, the most abundant and the most widely-distributed of all the elements, is a gas without color, odor or taste. In its free state (mixed, not combined, with nitrogen) it composes about one fifth of the air. Combined with hydrogen, it makes about eight ninths of all the water on the globe. Nearly half of the earth's crust is oxygen in combination. It combines with all other elementary substances except fluorine, argon and several very rare gases resembling argon. It is necessary to animal life, and early chemists called it vital air. It was discovered at almost the same time in 1774 by Priestley and by Scheele. Lavoisier made many ingenious experiments to prove that the combustion or burning of bodies in the air is only their combination with oxygen. Combustible substances burn much more vigorously in pure oxygen than in air. Oxygen is continually given off by the leaves of plants in sunlight, and this is evidently the source of the atmospheric supply, for the gas is continually consumed by the breathing of animals, combustion and decay.

Oyama (*o-yah'mah*), **Marquis Iwao,** a distinguished Japanese soldier, was born in the province of Satsuma in 1842. He was tutored in his early youth by Saigo Nanshu, who is considered by the Jananese the greatest military genius whom Japan has produced since the days of Iyeyasu, under whom he fought in the War of Restoration when the imperial forces fought against the men of the *shogun.* He was a military attaché through the Franco-Prussian war, and studied in Germany from 1872 to 1875. In 1877, when the Satsuma men under the leadership of Saigo Nanshu, his old master, took the field against the imperial forces, Oyama, at the head of a division of the imperial forces, took the field against them. He served with distinction as Chief of Police, Associate-Minister of the Interior and Vice-Minister of War, and in 1882 was given the portfolio of Minister of War. In 1884 he was appointed Chief of the General Staff, and 10 years later in the Chino-Japanese war commanded in the field the army entrusted to besiege Port Arthur. Twenty-four hours after the siege began he was being carried through the streets of the fortress, once thought impregnable, on the shoulders of his men. In the Russo-Japanese war he was Commander-in-Chief of the five Japanese armies in Manchuria and won the battle of Mukden against Kuropatkin, Russia's greatest general. Marchioness Oyama is a graduate of Vassar College. He died in 1916.

Oys'ter, a common bivalve-shelled mollusk, extensively used as food. It is related to the clam and mussel, belonging to that group of mollusks with plate-like gills (*Lamellibranchiata*). The two valves of the shell in the clam and mussel are similar; but in the oyster one side (the lower one) is much larger. In clams and mussels the shell is closed by a pair of muscles, located at either end of the shell, but in the oyster there is a single muscle located near the center of the shell. The dark violet spot on the inside of an oyster-shell marks the position of that muscle. In structure and habits the oysters are much like the clams. The water is strained through the gills, and the minute food particles are thus separated. They are carried forward to the mouth by the action of cilia. The digestive and circulatory systems are fairly well developed. The nervous system consists of three chief clusters of nerve-cells with connectives and nerve fibers. Oysters were formerly distributed along the Atlantic coast, from the Gulf of St. Lawrence to the Gulf of Mexico, but are now rare north of Cape Cod. Chesapeake Bay is the center of the oyster-beds. There are two kinds—a rounded form, found north, and a more southern, elongated form. They are found also on the coasts of England, Europe, Japan, the Cape of Good Hope and Australia. The fisheries are very extensive, and the animals are protected by laws. From May to September they are not caught, as that covers the period of breeding. The United States leads the world in the production of oysters, and far the largest supply comes from Maryland. Annually more than 29,000,000 bushels are taken on the coast of the United States, valued at more than $16,500,000. Oysters were used as food by the ancient Romans, and it is claimed that the Japanese engaged in oyster culture 18 centuries before Christ. See Brook's *The Oyster.*

O'zark Mountains, a range in Missouri. They start from Missouri River, cross part of Missouri and Arkansas, and enter Indian Territory. The Black Hills and the Washita Mountains of Arkansas are parts of the range. The highest peaks have an elevation of 1,500 to 2,000 feet.

O'ziums are the largest group of Pueblo Indians. Their village is situated on a small stream about 40 miles southwest of Fort Wingate near the western boundary of New Mexico. They number about 1,500, and are slowly decreasing. They are peaceable, industrious in their native arts, faithful to their ancient beliefs. In agriculture, house-building, pottery, weaving, social organization and ceremonial observances they resemble the Pueblos generally, of whom they and the Hopi may be considered the most typical tribes. They are a remnant of the Aztec empire.

O'zone is the active form of oxygen which is produced by the action of electricity upon ordinary oxygen and in other ways. It is not possible to convert oxygen gas entirely into this form. But, by cooling a mixture of oxygen and ozone to a low temperature, the ozone may be condensed to a deep blue liquid which is unstable and readily explodes. When mixed with air, as ordinarily obtained, ozone possesses a powerful odor resembling that of diluted chlorine and is the most powerful oxidizing agent known, attacking india-rubber, paper and other organic substances and corroding mercury at ordinary temperatures. It is unstable and gradually changes to ordinary oxygen upon standing, while it undergoes this change instantly upon heating. It has been shown that ozone gas is one and one half times as heavy as oxygen; hence chemists believe that the particles or molecules of this gas are made of three oxygen atoms, while ordinary oxygen molecules are made of two atoms. Very minute quantities of ozone probably exist in pure air, particularly that coming from the sea. The popular notion that this ozone is beneficial to health is not based on any certain facts.

H. L. Wells.

P

P (*pē*), the sixteenth letter, is a voiceless consonant. It is articulated at the lips, and is called a sharp labial, as in *cup*, *pea*, *spy*. Initial *p* before *n*, *sh*, *s* and *t* is silent, as in *pneumatic*, *psalm*, *pshaw*, *ptarmigan*. *P* also is silent in *accompt*, *corps*, *raspberry*, *receipt*, *sempstress*. No native English word begins with *pn*, *ps* or *pt*.

Pacif'ic Ocean or **South Sea** is the largest of the divisions of the ocean, including about half of the water surface of the globe and covering more than one third of the whole earth. It is 7,000 miles long, and its greatest breadth is 10,000 miles, with an area of 56,000,000 square miles. It is deeper than the Atlantic, averaging about 2,530 fathoms. There are two trade-winds, blowing almost constantly, one from the northeast and the other from the southeast, on which the surface currents of the ocean depend. Along the equator is a region of calms, and north and south of the trade-winds there are belts of calms. A cold current from the Antarctic Ocean flows along the coasts of South America, and a warm current from the equator flows west, dividing into two branches; one known as the Japan or north equatorial current flows north past Alaska, resembling in its effects the Gulf Stream in the Atlantic; the other turns south and flows along the shores of Australia and New Zealand. (See OCEAN-CURRENTS).

The largest American river flowing into the Pacific is the Yukon, 2,000 miles long, emptying into Bering Sea; besides this are the Fraser, Columbia, Sacramento and Colorado Rivers. The rivers of South America flowing into this ocean are only mountain streams, as the Andes Mountains approach so closely to the coast. The rivers of Asia, however, that flow into the Pacific are among the largest in the world, including the Amur, Hoang-ho, Yang-tse-Kiang, Mekong and Menam. The coasts of America and Australia bordering on the Pacific are generally mountainous, though the shores of Alaska are low and swampy, and the southern part of South America is broken with bays and islands. The Gulfs of California, Panama and Guayaquil are the most important gulfs of the Pacific on its American coast. The coasts of Asia are low and fertile, with many gulfs, bays and groups of islands. Bering Okhotsk, Japan, Yellow and China Seas are formed by the peninsulas and islands on the Asiatic coast.

The Pacific is remarkable for its myriad small islands and groups of islands. On the American coast are Vancouver, Queen Charlotte, Prince of Wales and others in British America; Tierra del Fuego, the islands on the coast of Chile and the Aleutian Islands; the islands of Japan, Formosa, Philippine Islands, Borneo, Celebes, Sumatra, Java and New Guinea are Asiatic islands, while in mid-ocean are many groups of volcanic origin. The Hawaiian, Ladrone, Marshall and Gilbert Islands in the North Pacific and the New Hebrides, Society, Fiji and Friendly (or Tonga) Islands are the principal of these island groups.

The Pacific was first seen (1513) by Europeans from a mountain in Panama, by Balboa, a Spaniard. Magellan, making his way through the Strait of Magellan, was the first European to sail it (1520). He named it Pacific, because of its quiet waters. The first English navigator that explored it for any distance was Sir Francis Drake. The northwest passage through the Arctic Ocean into the Pacific was discovered by Sir Robert McClure in 1850, and the northeast passage in 1874 by Nordenskjöld.

Pack'ard, Alpheus Spring, an American naturalist, was born at Brunswick, Me., Feb. 19, 1839, graduated from Bowdoin in 1861, and became assistant to Agassiz at Cambridge. After taking part in several scientific expeditions, he became state entomologist of Massachusetts and professor of zoology and geology at Brown University. He was widely known as an entomologist and zoologist; founded and for about 20 years edited *The American Naturalist;* and for five years (1877-82) was a member of the national entomological commission. During the Civil War he was assistant surgeon to the Maine Volunteers, and for about a year did much service in the field. Afterwards, for a time, he was librarian and custodian of the Society of Natural History at Boston. He also for a number of years was curator and a director at Peabody Institute, and an authority on agricultural insect pests. He died in 1905. Besides many technical papers, his publications include *Guide to the Study of Insects*, *Our Common Insects*, *Zoology*, *Entomology for Beginners*, *Text-Book of Entomology*, *The Mammoth Cave*, *Life History of Animals*, *Half Hours with Insects*, *Observations on Glacial Phenomena*, *Insects Injurious to*

Trees, A Naturalist on the Labrador Coast and *Lamarck: the Founder of Evolution.*

Paderewski (*pȧ'dĕ-rĕf'skē*), **Ignace Jan,** a Polish pianist, was born in Podolia, a province of Russian Poland, in 1860. He began his musical studies when six, but with very imperfect teachers, and at 12 went to the conservatory at Warsaw. He made his first musical tour through Russia at 16, and was made a professor of music in the conservatory. Subsequently he gave himself still more devotedly to his art, studying at Berlin and Vienna, and was appointed a professor in the conservatory at Strassburg in 1883. He made his first public appearance in 1887. During the next four years a series of recitals in the great cities of Europe and America established his reputation as the greatest pianist since Liszt. He was also a composer of note, his chief works being "Manru," an opera, "Polish Dances," "Song of the Voyager" the famous "Minuet" and other pieces for piano.

During the World War Paderewski refused to touch the piano. He and his wife organized relief work for devastated Poland, and he also directed the equipment and training of an American-Polish legion to fight for the Allies. He became the first premier of reconstructed Poland, and at the peace conference eloquently voiced the political aspirations of his country as he had previously interpreted its spirit in music. For a year he was a frequent visitor in Paris, London and Washington.

Padua (*păd'û-ä*) or **Padova,** one of the oldest cities of Italy, was in the 5th century ruled by the Huns, then exchanged between the Goths and the Byzantine empire, and from 1318 to 1405 was ruled independently by a lord. In the latter year it was conquered by Venice, which held it until 1797, when it was given to Austria, which, except from 1805 to 1814, ruled it until incorporated into Italy in 1866. The old streets are dark and narrow, and a wall still surrounds the town. The most notable building is the municipal palace (1172-1219), whose roof, 267½ feet by 89, is the largest in Europe unsupported by pillars. Padua also has many old churches. The university, which dates from 1222 and has 71 teachers and 1,364 students, has long been celebrated. There is no manufacturing industry. Population 96,135.

Padu'cah, Ky., the seat of McCracken County, stands on the Ohio about 48 miles above its mouth, and enjoys a large river and rail trade. The principal thing of note connected with Paducah is its ice-harbor in the mouth of the Tennessee where boats from the northern courses of the Mississippi, Ohio and Illinois Rivers lie through the winter, thus avoiding the freezing of ice and its effects on them. Marine ways and dry-docks of large capacity are here. One of the largest peanut factories in the south; glass-plant; largest basket factory in the south if not in the world; immense river traffic; largest Illinois Central shops outside of Burnside, Ill.; cordage factory, knitting mills and pants factory are among the industries. It does the largest wholesale business of any city in the state except Louisville, and the lumber mills make large foreign shipments. The city has an excellent public school system, many fine school-buildings and the service of two railroads. Population 27,000.

Paganini (*pä'gȧ-nē'nē*), **Nicolo,** a famous Italian violinist, was a porter's son, born at Genoa, Feb. 18, 1782. He early devoted himself to his instrument, practicing sometimes ten hours at a stretch, and in 1793 gave his first concert. His professional tours began in Italy in 1805, extended through Germany and Austria in 1828 and 1829 and Paris and London in 1831. He returned to Italy very wealthy and died at Nice, his violin in his hand, May 27, 1840. See Grove's *Dictionary of Music,* Vol. II, and Engle's *From Mozart to Mario.*

Page, Thomas Nelson, noted as a writer of stories and poems in the negro dialect was born in Hanover County, Va., April 23, 1853. He studied at Washington and Lee University, and for a time practiced law at Richmond. He wrote his first story, *Marse Chan,* in 1884, and a collection of his writings is published under the title *In Ole Virginia. Meh Lady* and *Marse Chan* are two of his most popular books. In 1888 he published a volume of verse entitled *Befo' de War,* and in 1892 issued a collection of essays bearing the title of *The New South.* His other realistic stories and novels include *Two Little Confederates, Elsket, On Newfound River, Pastime Stories, Red Rock* and *Gordon Keith*—almost all his work deals with southern and, chiefly, with negro life, in Virginia. In 1913 President Wilson appointed him Ambassador to Italy. Died 1922.

Page, Walter H., American Ambassador to England under Wilson, was born in Cary, N. C., Aug. 15, 1855. Graduating from Johns Hopkins, he became a newspaper writer and, later, successively editor of the *Forum* and the *Atlantic Monthly.* As a member of the publishing firm of Doubleday, Page & Company, he established the *World's Work.* On account of his rare ability in dealing with social problems, he was appointed a member of the Country Life Commission by Roosevelt. He died in 1920.

Page, William, an American painter, was born at Albany, N. Y., Jan. 23, 1811. He received a premium from the American Institute in New York for a drawing in india ink when 11, and a medal from the National Academy before he was 17. His full-length portrait of Farragut at the battle of Mobile was presented by a committee in 1871 to the emperor of Russia. He died on Staten Island, New York, Oct. 1, 1885.

Paine, Robert Treat, an American statesman, was born at Boston, March 11, 1731. He was a graduate of Harvard and a student of theology and law. He was chaplain in 1755 of the provincial army of the northern border, and became prominent in the contests preceding the Revolution, being a delegate of the convention called in 1768 at Boston and in 1770 managing the prosecution of Captain Preston for firing on the people. He was a member of the General assembly of Massachusetts in 1773 and 1774 and of the Continental Congress from 1774 to 1778, and also signed the Declaration of Independence. He was judge of the supreme court of Massachusetts and attorney-general for ten years. He died at Boston, May 11, 1814.

Paine, Thomas, an English writer and free thinker, was born in Norfolk, Jan. 29, 1737, and became staymaker, marine, schoolmaster, exciseman and tobacconist in turn. In 1774 he sailed for America. In 1776 his pamphlet *Common Sense* appeared, followed a year later by *The Crisis.* While he was serving as a private at Trenton, Congress gave him the position of secretary of the committee of foreign affairs, but he lost the post in 1779 and was appointed clerk of the Pennsylvania legislature. In 1785 he was given $3,000 and the New Rochelle farm by Congress. He returned to England in 1787, and in 1791-92 published his *Rights of Man* and the famous reply to Burke's *Reflections upon the French Revolution.* This work caused much trouble and he fled to Paris, where he was elected to the national convention which tried Louis XVI. Favoring the king, he offended Robespierre and was imprisoned eleven months. Before his arrest he had written Part One of *The Age of Reason,* and Parts Two and Three appeared in 1795 and 1807. In this he decried atheism and Christianity and advocated deism. He returned to America in 1802, became a drunkard, and died at New York, June 8, 1809. See Leslie Stephen's *History of English Thought in the 18th Century.*

Pais'ley, a city in Renfrewshire, Scotland, is situated on the White Cart, three miles above the Clyde and six from Glasgow. It was first heard of in 1157, was burned by the English in 1307, and suffered in the Reformation in 1561. It was made a free burgh in 1488. The chief public edifices are the municipal buildings, courthouse the county buildings and library and museum. The manufacture of Paisley shawls has become extinct, but the works of cotton thread, dyeing, bleaching, tartans, woolen shawls, chemicals, starch, corn flour, carpets, and distilling and brewing flourish. Population 84,477.

Palatinate (*pȧ-lăt'ĭn-ât*), the name of two German states united before 1623. They were called the Upper and the Lower Palatinate, the Upper being what now is the kingdom of Bavaria, and the Lower lying on both sides of the Rhine and bounded by Mainz, Treves, Lorraine, Alsace, Baden and Württemberg. The capital was Heidelberg. The Rhenish Palatinate was established as an hereditary possession as early as the 11th century, and in 1216 it was granted to the duke of Bavaria, and this and the Bavarian territory were held by the Bavarian house. In 1559 the Rhenish territory and the electoral vote passed to Frederick III; afterward to Frederick V; and finally to his son. In 1801 France took possession of the western part and gave the eastern to Bavaria, Nassau and Hesse-Darmstadt. The left bank was restored to Germany in 1815, the larger part going to Bavaria, the rest being divided among other provinces. To-day two districts of Bavaria are known as the Palatinate proper (Rheinpfalz) with an area of 2,372 square miles (population 937,085) and Upper Palatinate (Oberpfalz), with an area of 3,862 square miles (population 600,284). The capital of the latter is Ratisbon (Regensburg) on the Danube, population 52,624.

Pal'atine Hill. See ROME.

Pa'leobot'any, the science which deals with fossil plants. It is the correlative of paleontology, which deals with fossil animals. It is the function of paleobotany to work out the history of plant-life on the earth. This involves the determination, as far as possible, of plants which have lived in successive ages and the relations of those of one age to those of previous and succeeding ages. The science is as yet but poorly developed.

Pa'leontol'ogy, the science which deals with fossils. Vertebrate paleontology deals with the fossils of vertebrates; invertebrate paleontology with the fossils of invertebrates; paleobotany with the fossils of plants. All system of rocks younger than the archean contain fossils. Roughly speaking, they are more abundant in the later systems than in the earlier, and but few have been found in the Algonkian. The animal and plant fossils of a given system of rocks represent the fauna and flora, respectively, of the period when the system was formed. It is customary to speak of the fossils themselves as the fauna and flora, the cambrian fauna consists of the fossils of the cambrian system; the lower cambrian fauna of the fossils of the lower division of the cambrian system; the middle cambrian fauna of the fossils of the middle division of the cambrian system; and so on. It is the province of paleontology to determine (1) what fossil forms occur in the rocks of each system and in the rocks of each part of each system; (2) the origin of each fauna; and (3) the relations of each fauna to its successor The first point mentioned above involves a knowledge of the geographic diversity of animals at each stage of the earth's history. For example, there have been times when faunas were essentially cosmopolitan, that is, when the same species were essentially worldwide in their distribution. There have been other times when the faunas were colonial, that is, when geographic diversity was very great. These facts and their explanation belong to paleontology. Paleontology also involves the study of the fossils in the earlier and later parts of a system. The second point mentioned above involves the determination of the question as to whether the fauna of a given system or part of a system originated from the fauna which lived in the same region at an earlier time; or whether it represents immigrants into the region where it occurs; or, lastly, whether it resulted from the commingling of resident forms with immigrants. The third point mentioned above is akin to the second. It considers a fauna in connection with its successors and descendants, instead of in connection with its predecessors and ancestors. A complete knowledge of paleontology would involve a complete knowledge of the living forms of each stage of the earth's history. It would do for all forms of life what history essays to do for the human race.

Paleontology is of great service in determining, or helping to determine, the age of rock formations, when their age could not be determined by other means. After the study of fossils has progressed so far as to make known the faunas of successive periods, the finding of the fossils of any one of these faunas in a given bed of rock determines the age of the bed. In making such determinations the general character of the fauna as a whole, rather than any single species. is to be relied on. Those phases of paleontology which involve the study of fossils for determining the age of formations or for determining the relations of land and water at successive periods or for the determination of geologic conditions of any sort are sometimes called *paleontologic geology*. Paleontologic geology, therefore, involves the study of fossils for the light they may throw on earth history. Paleontology also affords one of the chief lines of investigation for the solution of many of the problems of biological evolution. Those phases of paleontology which involve the study of fossils for the light they may throw on the history of the animal life of earth are *paleontologic zoology*. The term *paleontologic botany* would have a corresponding meaning in connection with plant life.

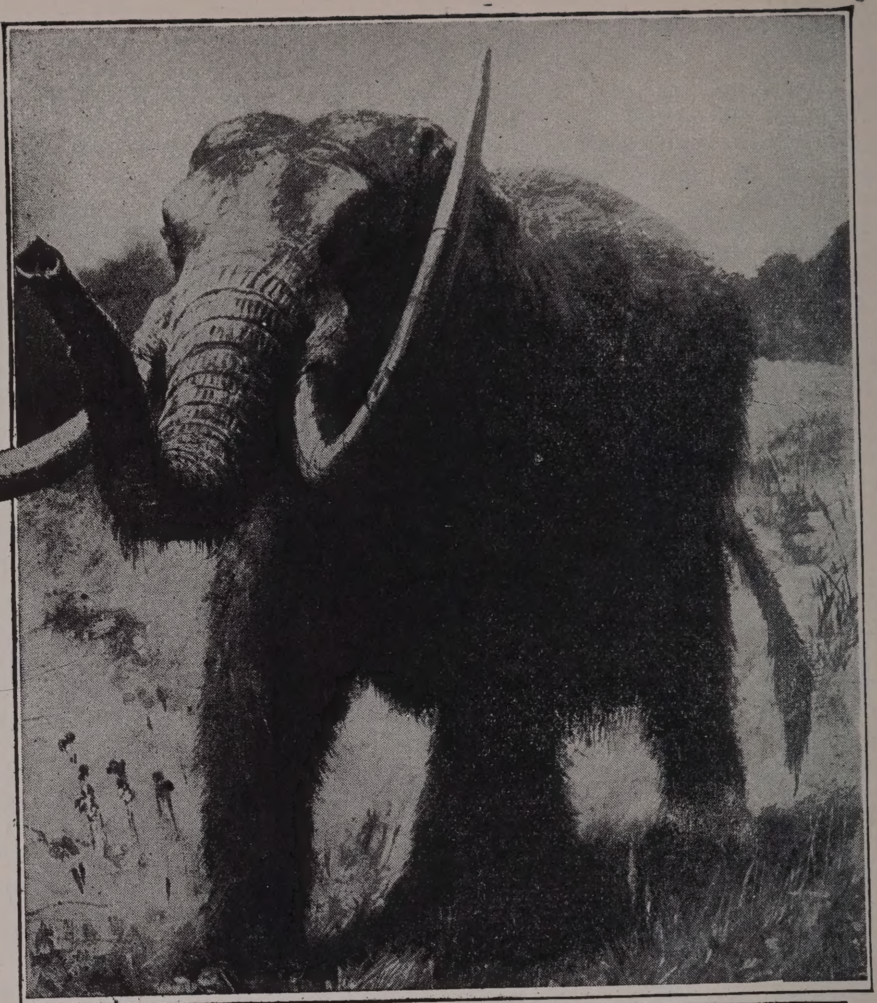
In a general way it is true that the animals and plants of any period are, on the whole, of higher types than those of preceding periods; but, while this is true as a general statement, it does not follow that the representatives of any class of animals in any given period are of higher type than any of the representatives of the same class at an earlier time. For example, trilobites became extinct at the end of the paleozoic era. (See GEOLOGY.) The last of the trilobites were not higher in type than earlier representatives of the same group. The living representatives of some types of animals are less highly organized than ancient representatives of the same type. Paleontology seems to show that evolution is primarily *differentiation*, not *ascent*. Differentiation, in this connection, means the derivation of various types from a single type. Some of these derivative forms may be higher than the ancestral form, while others are lower. In the struggle for existence the higher types, on the whole, seem to have got the better of the lower, not to the extent of annihilating the latter, but to the extent of allowing the former to dominate them. While the succession of fossils supports, in a general way, the doctrine of evolution, it has, in few cases, afforded the specific forms which demonstrate a connected line of ancestry between living forms and very ancient ones.

It is probably true that many forms of life which have lived in the past were never fossilized. It is probably true that very many forms which have been fossilized have not been found. Most fossils which are now known are the fossils of species which lived in shallow water or in marshes and lakes. Relics of those forms of life which lived on dry land are rarely preserved. The relics of animals which live in the deep sea are likely to be preserved, but have rarely become accessible, for the fossiliferous formations of the land were, for the most part, made in shallow water. Present knowledge of ancient life is, therefore, very far from complete, and must always remain so.

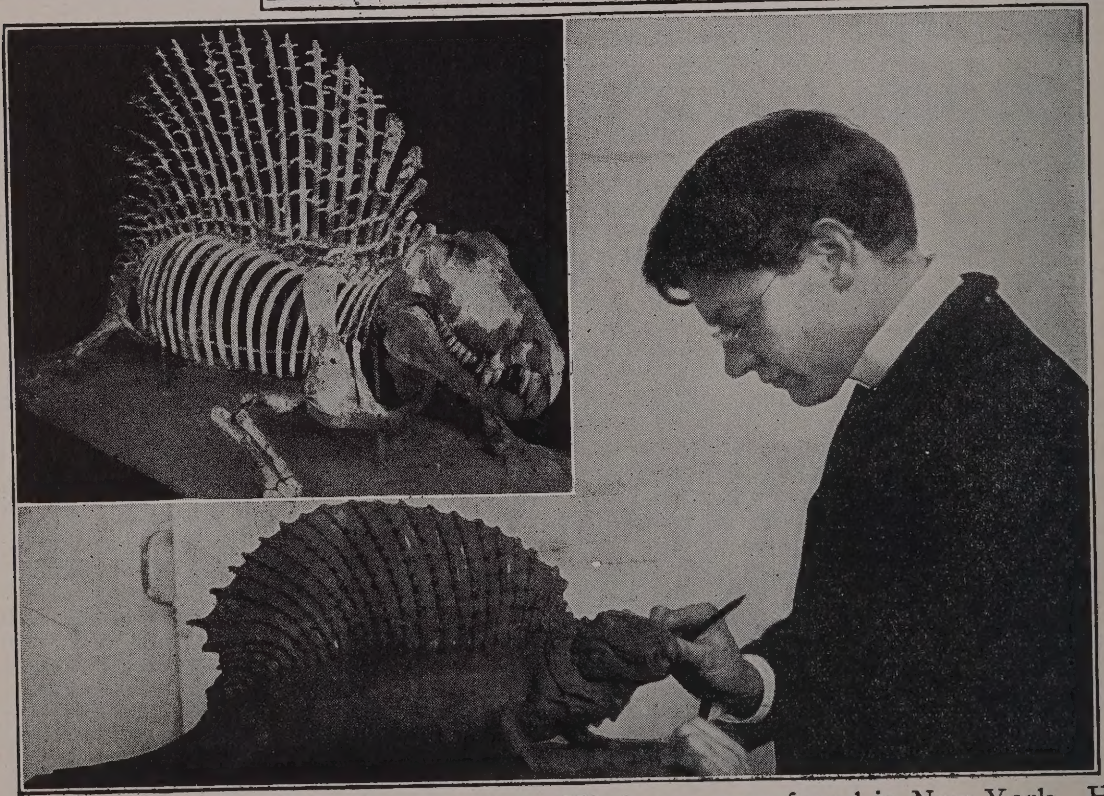
R. D. SALISBURY.

Palermo (*pȧ-lĕr'mō*), a seaport, archbishopric, former capital of Sicily, now the fifth city of Italy, stands on the northwest corner of the island in a valley before Mount Pellegrino. The city was first known as the Phœnician Panormus. It was successively conquered by Pyrrhus (276 B. C.), by the Romans (254 B. C.), by the Vandals (440 A. D.), by Belisarius, the Saracens, the Pisans and the Normans. In the earthquakes of 1693, 1726 and 1823 the city suffered much. It revolted against the kings of Naples in 1820 and 1848, and was freed by Garibaldi in 1860. The streets are lined with old and picturesque buildings of interesting architecture, the most conspicuous being the Cathedral of St. Rosalie, the royal palace, the churches of Martorana, St. John of the Hermits and San Cataldo, the archbishop's palace, town house and arsenal. A state university founded in 1805 has its seat at Palermo, with a teaching faculty of 61 and 1,083 attending students. The industries are insignificant, but the shipping

THREE MONSTERS OF OTHER DAYS



Skull of an Eyrops, chief prey of the Naosaurus.



That "hairy elephant" is a mastodon. His bones were found in New York. He measured 14 ft. 11 in. from the base of tusks to tail. The artist is modeling the Naosaurus or fin-backed lizard, whose skeleton was found in Texas. The Naosaurus was 9 ft. long and 5 ft. high.

of oranges, lemons, dried fruits, sumac, tartar, grain, oils, manna, sulphur, wine and lemon juice are very large. Population 319,000. See Freeman's *History of Sicily*.

Pal'estine, the Bible's land of Canaan, land of promise, Holy Land and land of Israel, was at the time of the conquest inhabited by six nations: the Canaanites, Hivites, Hittites, Ammonites, Perizzites and Jebusites. The invaders settled in allotted lands, and the struggles for possession followed for some years, although no tribes were dispossessed. In early times the tribal distinctions were strongly preserved, but later, as spoken of in *Judges*, the cities rose and fell, and Jerusalem became the capital of David and Solomon; but on the founding of the northern kingdom Shechem, Tirzah and Samaria became in succession the capital. On the return of the Jews from captivity they inhabited the territory between Jerusalem and Beersheba and Jericho and Lachish, while the Philistines retained their lands undisturbed. Under Herod the Great, who governed the entire country, the kingdom included Galilee, almost unknown in the Old Testament, Samaria, Judæa, Idumæa, Peræa, Gaulonitis, Auranitis and Trachonitis. The most populous and fertile of these provinces was Galilee. The prosperity fostered by the Roman rulers disappeared on the conquest by Vespasian and the destruction of the temple by Titus. The second time the Jews rose in revolt, led by Bar-Cochba the pretended Messiah, led to the bloodiest of all wars, including the siege of Jerusalem, but the revolt was put down before the fortress of Bether. (See JEWS). For the next hundred years the progress of Christianity was rapid, and after the conversion of Constantine and the building of the Church of the Holy Sepulchre the history for three hundred years is the story of the church. In 614 A. D. King Chosroes of Persia entered Syria and was joined by the Jews, who looked to him for deliverance. They massacred 90,000 Christians in Jerusalem and burned all the buildings. Fifteen years later the country was retaken by Heraclius, only to have it fall into the hands of the Mohammedans, in whose control it remained for four hundred years. About 640 the Mosque of Omar, the most beautiful building in the world, was built by Byzantine architects. The crusades failed to relieve the oppression, and the country went from bad to worse until conquered by the English under General Allenby in the World War. (*q. v.*)

Palestine covers an area of about 12,000 square miles, is bounded on the north by the river Kasimiyeh, on the east by the Jordan and on the west by the sea. Ranges of hills run over the entire country from east to west and, as the Bible says, it consists of desert, hills, plains and valley. The principal elevations are Jebel Jermûk, 3,934 feet; Mounts Carmel, Ebal, Gerizim, Tell Asur and Râsesh Sherifeh. The valley of the Jordan begins near the Mediterranean and runs from 5 to 13 miles wide to the plain of Jericho. The Dead Sea is another feature of interest, it having no issue for its waters save by evaporation. The country has few rivers. The Mefshukh, Namien, El Mukatta and a few others flow into the Mediterranean; the Yarmuk, Rukkad, Zerka and Mojib flow into the Sea of Galilee. The summers are extremely warm and the winters cold and wet. At present the modern spirit of improvement is at work in Palestine, roads are being built, railroads run from Jaffa to Jerusalem, from Beirut to Damascus and from Haifa to Damascus, and new colonies with new buildings are scattered over the entire land. The ruins are disappearing, and a modern country is springing up from the ashes. Population estimated at 1,000,000. See E. Hull's *Physical Geology and Geography of Arabia Petræa and Palestine*.

Palestine, Tex., city, county-seat of Anderson County, about 135 miles north of Houston. In the vicinity are salt mines and iron-ore deposits. The most important agricultural product is cotton, although grain, fruit and vegetables are grown. Among the manufactures are cottonseed-oil, flour, pottery, iron products and packed-beef. It has good schools, waterworks, gas and electric lights. Population 12,000.

Palestrina (*pä'läs-trē'nä*), **Giovanni Pierluigi da,** the greatest Italian composer, was born in 1524 at Palestrina, studied at Rome and in 1551 was made musical director of the Julian chapel of St. Peter's by Pope Julius III. In 1554 he published a collection of masses and became one of the singers of the Sistine Chapel, a position which he lost upon the accession of Paul IV. But in 1555 he became choir-master of the Lateran, and in 1561 was given a similar position in St. Maria Maggiore, which he held to 1571, when he returned to the Julian Chapel. He reconstructed the musical service of the Roman church, combining musical science with art, and takes a front rank in musical history. All his numerous compositions are sacred music. He died at Rome on Feb. 2, 1594. See *Life* by Baini.

Pal'et (in plants). The prominent bracts associated with the inflorescence of grasses are called glumes, and those immediately about the individual flowers are called palets. See GRASS.

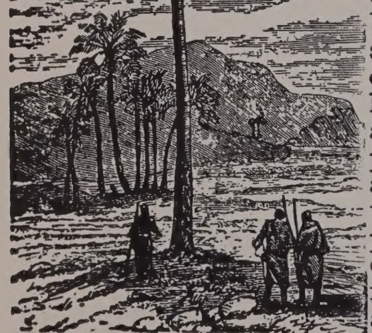
Pal'impsest, the name given to ancient parchments which have been used more than once for writing purposes. The conquest of Egypt by the Saracens cut off from Europe the papyrus which was used to write upon, and parchment could be had only in limited quantities. So, through the dark ages, old manuscripts were used, after removing the first writing upon them. Sometimes the writing was washed off with a sponge, and the parchment smoothed with pumice stone;

at other times the letters were scraped away with a sharp blade. Nearly all ancient manuscripts, however, were written with an ink which could not be entirely removed, and traces of a former writing could be seen beneath the new copy. In modern times there have been various efforts to restore these ancient writings by some chemical treatment. In this way have been found copies of the *Republic* of Cicero, the *Institutes* of Gaius, a part of the *Epistle to the Romans* and other parts of the Old and New Testaments. The *Republic* of Cicero was covered by a commentary on the *Psalms*, written by St. Augustine.

Palissy (*pȧ'lḗ'sḗ'*), **Bernard,** the great French potter, was born near Agen in 1509, and wandered as a glass and portrait painter until he married and settled in Saintes in 1538. While working here as a surveyor, his attention was attracted by an enameled cup, and he determined to discover the process. After 16 years of continuous labor and experiment, in which he used all his resources and burned the tables and floors for fuel, he succeeded, and, though imprisoned in 1562 as a Huguenot, he was released by royal edict and appointed "inventor of figurines" to the king. He removed to Paris in 1564, and, through the aid of Catherine dei Medici, was saved from the massacre of St. Bartholomew. From 1575 to 1584 he gave a course of lectures on physics and natural history, demonstrating the origin of springs, the formation of fossil shells and the best method of purifying water. In 1585, however, he was again arrested as a Huguenot and imprisoned in the Bastille, where he died in 1589. See H. Morley's *Palissy the Potter.*

Pal'las. See Minerva.

Palm, species of the great tropical family *Palmaceæ.* Palms are the tree monocotyledons, and there are more than 1,000 species. The palmetto of the Gulf States is a diminutive representative of the group. The body consists of a tall, unbranched, columnar trunk bearing at its summit a crown of immense leaves, which are pinnately or palmately veined and often splitting so as to appear lobed or compound. The flower clusters arise from the leafy crown and usually are very large and pendent. Aside from their ornamental purposes, palms are very useful. Notable among the useful forms are the date palm with its pulpy fruit, the cocoanut palm with its huge seeds full of edible endosperm, the sago palm whose pith yields the starchy sago and the ivory palm whose hard endosperm is the vegetable ivory. Palm honey, palm-wine and palm-oil are also well-known products. The leaves and stems of many of the species are used for making hats, baskets, fans About 60 species of hardy palms are grown in California. Of our few native palms the most common is the palmetto. Palms vary in height from three to 100 feet. The palm of history and of the Bible is the date-palm, while the most prized ornamental species is the royal palm.


PALMYRA PALM

Pal'ma, Tomas Estrado, the first president of Cuba, was born in Bayama, Santiago de Cuba, June 9th, 1835. The son of a wealthy planter, he was educated at Havana and subsequently studied law at the University of Seville in Spain. Upon the outbreak of the Ten Years' War (1868-78) in Cuba he joined the insurgents and soon rose to the rank of general. Under the provisional Cuban government he was successively elected to the assembly, made secretary of state, and elected president. Soon after, he was captured by the Spaniards and taken prisoner to Spain, and his estates in Cuba were confiscated. Having regained his liberty, he settled in Honduras. A little later he removed to New York and opened a school for Cuban-American boys at Central Valley in Orange County. In 1895 the Cubans again rebelled and in July of the same year he was elected president of the associated Cuban clubs in the United States. After the Spanish-American War which liberated Cuba, Palma was elected the first president of the new Cuban Republic (Oct., 1901). He was inaugurated on May 20th, 1902, and on the same day the United States relinquished all claim to jurisdiction over the internal affairs of the new nation. In 1906 another insurrection broke out, due primarily to the very general belief that the voice of the people had been stifled at the polls in 1905 and that by means of pressure and intimidation President Palma had brought about his re-election. This led to the United States' interference in behalf of peace. Palma being unwilling to meet the conditions imposed and the investigation that was to follow, on September 28th, 1906, tendered his resignation and retired to his old home town of Bayama. On the following day the United States secretary of war by the authority of President Roosevelt proclaimed himself provisional governor of Cuba. He died, Nov. 4, 1908. See Cuba.

Palm'er, Alice Freeman, an active educator and social reformer. was born at

Colesville, N. Y., in 1855, and died somewhat suddenly in Paris, France, in 1902. She studied at the University of Michigan, was teacher in a high school from 1876 to 1879, and in 1879 became professor of history in Wellesley College. In 1882 she became president of Wellesley College. She married Professor G. H. Palmer of Harvard University in 1887, and resigned her presidency. In 1892 she became (non-resident) dean of the Women's College at Chicago University. Mrs. Palmer was the recipient of honorary degrees from Michigan, Columbia and Union Universities.

Palmer, Erastus Dow, an American sculptor, was born at Pompey, N. Y., April 2, 1817. He was a joiner by trade, and made carvings first of animals and leaves in wood. Seeing a cameo head, he cut on a shell a portrait of his wife, and his success induced him to try working in marble. Two bas-reliefs, *Morning* and *Evening*, *The Sleeping Peri*, *The Angel at the Sepulchre* (in the cemetery at Albany), *Immortality*, *Faith* and *Sappho*, also bas-reliefs, are some of his best-known works. He executed busts of Alexander Hamilton, Washington Irving, Commodore Perry and others and a statue of Robert Livingstone for the state of New York, cast in bronze. *The Landing of the Pilgrims*, in the Capitol at Washington, is one of his largest works. He died in 1904.

Palmer, John M., a soldier and statesman of Illinois, was born at Eagle Creek, Ky., Sept. 13, 1817. He removed to Illinois when 14, and made his home at Carlinville. He was admitted to the bar in 1839. He was a state senator in 1852-5, and was prominent in the organization of the Republican party in 1856. At the outbreak of the war, he was given command of the 11th Ill. regiment. He became brigadier-general in the same year and major-general in 1862. He took part in the battles of New Madrid, Island No. 10, Corinth and Murfreesboro. In Sherman's campaign in 1864 General Palmer had command of the 14th corps. In 1868 he was elected governor of Illinois by the Republican party and served two terms. He was United States senator in 1891-7. In 1896 he was the candidate for the presidency upon the ticket of the "sound money" Democrats. He died on Sept. 25, 1900.

Palmer, Ray, an American clergyman, was born at Little Compton, R. I., Nov. 12, 1808. He graduated at Yale College, and studied theology, entering upon his pastoral work at Bath, Me. Most of his life was spent at Albany, N. Y., where he was one of the most prominent clergymen of the Congregational church. He is best known by his hymns, some of which are found in nearly every church-collection, and one of which, *My Faith Looks Up to Thee*, is widely used and very popular. Besides many hymns he wrote *Closet Hours; Remember Me; Home, the Unlost Paradise*, and *Earnest Words*. He died at Newark, N. J., March 29, 1887.

Palm'erston, Henry John Temple, Viscount, was born near Romsey, Hants, in England, on Oct. 20, 1784, and went to the University of Edinburgh in 1800, succeeded his father as viscount in 1802, and graduated from Cambridge in 1803. Of great ability, he was the candidate of the Tories from the university in 1806; he was defeated then and in 1807, but gained a seat in parliament in that year from the Isle of Wight. In 1811 he was elected from Cambridge and held his seat for 20 years, until he supported the reform bill. Then he successively represented Bletchingly, South Hampshire and Tiverton. In 1809, as a Tory, he was made junior lord of the admiralty and secretary of war, without a seat in the cabinet, and held the office until 1828. He left the Tory party in 1828 and entered the reform ranks, and under Earl Grey in 1830 became minister of foreign affairs, and as such adopted a policy which made England and France friends. He assisted in securing the independence of Belgium and in placing the thrones of Spain and Portugal on a constitutional basis. In 1841 he went out of office with the Whigs, but returned in 1846 as foreign minister and stirred up various difficulties through his policy. In 1850 a resolution of censure was introduced in the house of lords and a resolution of confidence in the lower house, and after a debate of four days the latter was carried. In December, 1851, Palmerston was asked to resign on account of the expression of his opinions regarding the actions of Louis Napoleon, but defeated the prime minister, Lord Russell, on the militia bill in the following February. He became home secretary in 1852 and in 1855 was made prime minister. Although his government was defeated in 1857, on an appeal to the country, it stood until February, 1858, when it fell before the conspiracy bill. In June, 1859, Palmerston was made first lord of the treasury, which post he retained until his death. Among the principal events of his official career were the American Civil War, Napoleon's war with Austria and the Austro-Prussian war with Denmark. He died at his country seat, near Hatfield, Hertfordshire, Oct. 18, 1865. His prevailing characteristics were oblivion of self, ardent desire to be the head of a people, not of a political party, and intense patriotism. See *Lives* by Anthony Trollope and the present Duke of Argyle.

Pal'mistry, is the art or practice of telling fortunes by inspection and interpretation of the lines and marks in the palm of the hand. In the palm of the hand are recognized three large principal lines: the first, the one nearest the fingers, is called the line of the heart, which when well-defined is said to signify strong and happy affection, but when broken it denotes inconstancy; the second, the line in the middle of the hand is the line of the head and in the same way denotes strong or weak mental faculties; the third, the line at the base of the thumb, is the line of life, and its distinctness and clearness determine the length of life and liableness to illness. These are said to represent the trinity of existence: The heart, sensation; the head, intelligence; life, action. In the palm are also slight elevations called mountains or mounts. These are named after the planets from which they receive according to their greater or less development favorable or unfavorable influences. Each has its particular significance. The mount at the base of the first finger is the mount of Jupiter and, normally developed, indicates love of honor and happy disposition; the one at the base of the middle finger is the mount of Saturn and denotes prudence and wisdom; the ring finger the mount of Apollo and denotes love of the beautiful and noble aspirations; the little finger the mount of Mercury and denotes love of science, industry and commerce; beneath Mercury the mount of Mars denotes courage and resolution; at the wrist the mount of the moon signifies a dreamy disposition and morality; at the thumb the mount of Venus denotes taste for beauty and loving temperament. Besides the lines and mounts there are squares, stars, circles, triangles, crosses, rings, points, islands, forks, branches and chains, which according to their arrangement corroborate or modify the deductions made from the interpretation of the mounts and lines. The general form of the hand and nails also has significance.

Palmistry is of great antiquity. It came from India and played an important part among the Chaldeans, Assyrians and Egyptians. The Jewish people possessed thousands of palmists. Solomon speaks of the art as having been perfected among the Hebrews. It was cultivated by such philosophers as Plato and Aristotle and was practiced in Rome. Augustus was considered an accomplished practitioner. It was of great repute in Europe in the middle ages. Cardanus is the author of what is considered the best work on the subject. It needs hardly be added that only a keenly imaginative person could hope to become a successful palmister.

Palmyra (*păl-mī′rȧ*), from 100 to 1300 A. D. a rich and beautiful city of Syria, stands in an oasis on the northern line of the Arabian desert, about 150 miles from Damascus on one side and the Euphrates on the other. It was supposed to have been founded by Solomon, but probably was a caravan station of the Arabs. During the wars between Rome and Parthia the city acknowledged Roman supremacy and gained much by it, inasmuch as it was made the object of many favors by the Roman emperors. In 272 the attempt to found an independent empire was crushed by Aurelian, and it remained a Roman dependency until it submitted, with the rest of Syria, to the Moslems. It began its retrograde career in the 15th century, and now is but a city of ruins. The ancient inhabitants tanned leather, controlled the desert caravan trade, and mined salt, gold and silver. See *Ruins of Palmyra* by Wood and Dawkins. See ZENOBIA.

Pa′lo Al′to, Cal., Santa Clara County, 27 miles south of San Francisco, is the seat of the university founded by Leland Stanford in memory of his son. This University provides education free, from the high school through college, including post-graduate and the highest research work. Its buildings are in the California Mission style, built of yellow sandstone around a quadrangle. The university has a faculty of 250, its students number 2,000, and there is an endowment of $30,000,000. Palo Alto has 8 churches, no saloons, and municipal ownership of public utilities. Manzanita Hall for boys, Castilleja School, Harker School for girls, St. Patrick's Theological Seminary are also located here. Palo Alto has a population of 6,000 and is the center of a closely settled community of 12,000. See STANFORD.

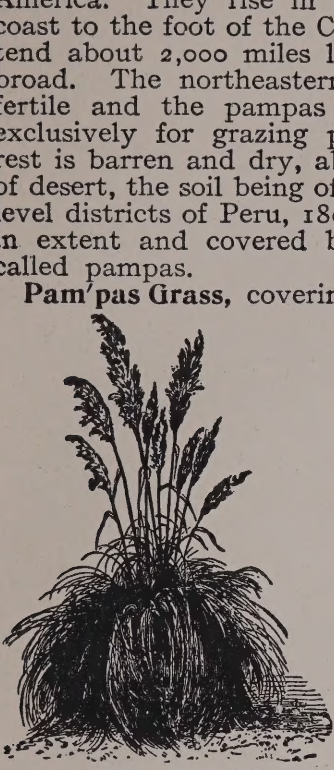
Palo Alto (*pä′lō̇ äl′tō̇*), **Battle of,** an engagement between American troops under General Taylor and the Mexicans led by General Arista. It took place (May 8, 1846) in the woods in the southern part of Texas, about eight miles northeast of Brownsville. The battle lasted five hours, and the Americans were victorious. Palo Alto is from the Spanish, meaning Tall Timber.

Pamir (*pä-mēr′*), the center of the central Asian highland system, is a lofty plateau with an average elevation of 13,000 feet, and unites the western ends of the Himalayas and Tian Shan mountains with the Hindu-Kush. It is crossed by mountain ranges, many peaks rising to enormous heights; and although exposed to great extremes of heat and cold and to severe snow and sand storms, the Kirghiz shepherds tend their flocks there and it is often crossed by travelers. It is full of animal and bird life, and has large rivers and lakes, including Karakul, 120 square miles, and Shivakul, 100 square miles. The Pamirs are often referred to as "the roof of the world," from their high elevation.

Pamlico (*păm′lĭ-kō*) **Sound,** a small arm of the Atlantic Ocean on the coast of North Carolina, is separated from the ocean by long, narrow islands of sand. It is very shallow, and is about 75 miles long by 10 to 25 wide.

Pam′pas, properly the large, treeless plains of the Argentine Republic in South America. They rise in terraces from the coast to the foot of the Cordilleras, and extend about 2,000 miles long by 500 miles broad. The northeastern portion is very fertile and the pampas are used almost exclusively for grazing purposes, but the rest is barren and dry, abounding in strips of desert, the soil being of sandy clay. The level districts of Peru, 180,000 square miles in extent and covered by trees, are also called pampas.

Pam′pas Grass, covering the pampas of the Argentine, is very hardy, beautiful in appearance and often used for ornament. The leaves are from six to eight feet long, and the flowering stems, with large spikes of silvery-white flowers, are from ten to 14 feet in height. The plant is now cultivated in California for the flower plumes, which are used in decorations by florists.



PAMPAS GRASS

Pan, according to the Greek story, is considered the god of pastures, forests and flocks and is represented as having horns, a goat's beard, a crooked nose, pointed ears, a tail and goat's feet. The worship of Pan began in Arcadia, and in time extended all over Greece, reaching Athens last. He was worshiped by offerings of cows, goats, lambs, milk, honey and wine. He was also supposed to have been very fond of music, being credited as the inventor of the syrinx or pandean pipes. The Romans have identified him as their god Faunus. The story of his death, coincident with the birth of Christ, is finely treated by Milton, Rabelais, Schiller and Mrs. Browning.

Panama (*păn′ȧ-mä′*). A small republic comprising the narrowest part of Central America, between Costa Rica and Colombia. It formerly belonged to Colombia, but seceded in November, 1903. It is 35 miles wide, and has an area of 31,571 square miles. The population is 400,000. The isthmus is traversed by a range of mountains running between the Atlantic and the Pacific, and many streams, some of considerable size, notably the Tuira (160 miles), flow into both oceans. The trading ports are Aspinwall (or Colon) and Panama, and the exports are hides, tallow, indigo, caoutchouc, coffee, vanilla, gold-dust and tortoise shell. A railway crosses the isthmus from Colon to Panama. The capital is Panama (population 35,500).

Panama Canal. The building of the Panama Canal may be said to be one of the greatest "military victories," as it is the greatest engineering achievement in history.

Remarkable Triumph of Sanitary Methods and Engineering Skill. Two brilliant engineers, Wallace and Stevens, found themselves so hampered under civil administration that they resigned. It was only when the enterprise was finally placed under control of Colonel G. W. Goethals, of the United States Army, as Chief Engineer and Chairman of the Isthmian Commission, that the work moved forward with extraordinary rapidity. It involved a war against unprecedented natural difficulties, including very unhealthful conditions, and to carry on the "campaign" men and supplies had to be transported 2,000 miles. The average number of men employed was 40,000, nearly half the number in our standing army, and the total cost was approximately $375,000,000 (See GOETHALS (*gō′thalz*) and GORGAS).

The two greatest enemies to be overcome were disease—malaria and yellow fever—and the treacherous sliding soil. Under the direction of Colonel W. C. Gorgas, also of the United States Army, the Canal Zone, one of the world's worst plague spots, was transformed. Mosquito breeding pools were filled, paving and sewage systems put in, and screened eating and sleeping places provided. "Today," says an officer of the Department of Sanitation, "healthy Americans work with vim under the hot sun and play baseball and other games. American women do housework, play tennis, ride horseback and dance enthusiastically, and their chubby little children, born and raised in Panama, play on the lawns."

How the Great Work was Accomplished. While modern sanitary methods and an expenditure of $20,000,000 changed living conditions, the sliding soil had to be dealt with to the end. These slides were particularly troublesome in Culebra cut. Sometimes there was iron pyrites in the soil and, this being exposed, created enough heat to prematurely explode the dynamite used in excavation work. "In case the soil was heated to a dangerous extent" writes Colonel Goethals, "it was allowed to cool before loading with dynamite."

Look at our illustrations and imagine the network of machinery in motion, the high speed cableways carrying building materials back and forth in buckets of three to five tons capacity at the rate of twenty miles an hour, the steam shovels taking up five to six tons with each scoop, 115 locomotives hauling 2,000 cars to the dumps from 1 to 33 miles away, and 21 cars, each carrying 600 tons, being cleared of their loads with plow unloaders in from four to six minutes. In this way you can form some conception of the process by which this great contribution to peace and commerce was actually accomplished in eight years, after being talked about for four centuries and attempted by the unfortunate De Lesseps, who, after six years of heavy expenditure of life, money, heroic devotion and engineering skill, found his brilliant name for a time, though unjustly, involved in the scandal of a company which failed owing nearly $370,000,000.

In 1903, 22 years after De Lesseps' little daughter turned the first spadeful of earth, the United States purchased the rights of the French Company for $40,000,000. Rejection by the Columbian senate of the treaty granting the United States the right to build the Canal led to the revolution of the district of Panama, its establishment as a republic, and the negotiation of the present treaty, which leases a zone 10 miles wide, including the cities of Panama and Colon, with their harbors excepted, in perpetuity. The lease provides for a yearly rental of $250,000 after nine years. Work was begun on May 4, 1904 and the great waterway opened for traffic Aug. 15, 1914.

How Ships are "Lifted" Across the Isthmus. A trip through the canal is an experience you would never forget. If you should take it at night, you would not only find the tropic air much pleasanter, but you would have the interesting experience of riding on a vessel over a grand water "boulevard" 50 miles long, and brilliantly illuminated all the way from Colon to Panama with electric lights.

If you make the passage from the Atlantic side, after a sail of seven miles through Limon Bay, you enter the first of a series of three locks. The two leaves of the great gate which have swung open to let you enter will close and lock you in while water runs into the chamber from the lock above until the water in the two is on a level. Then you will pass through two more locks, and so be raised, step by step, 85 feet.

Now the busy little electric cars which have pulled you through the locks, let go of you and you will sail at full ocean speed across Gatun Lake for 24 miles to Bas Obispo, the entrance to Culebra cut. Then comes a 9 miles' sail to Pedro Miguel where you again enter a lock and begin going "downstairs" to a small lake through which you sail for 1½ miles to Miraflores, where two more locks lower you to sea level and you pass out into the Pacific, 10 to 12 hours from the time you started.

The electricity for operating the locks, as well as for lighting the way and furnishing power for other purposes, is generated by turbines, using water from Gatun Lake. The lock gates are of steel, are 65 feet long, 7 ft. thick, from 47 to 82 ft. high, and weigh from 300 to 600 tons each. Every lock is divided by a middle wall, so that vessels going in opposite directions can pass. Between the gates at either end, as shown in one of our illustrations, is a series of intermediate gates. With these the locks are divided into smaller chambers to save time and water in handling smaller vessels. The usable length of the locks is 1,000 ft., and 95% of sea going vessels are less than 600 ft. long.

The Two Great Purposes of the Canal. The two great objects of the United States in building the canal were to place her navy in a better position to defend her coasts and to aid the world's commerce. (See CLAYTON-BULWER TREATY). Of still greater importance, it is believed, will be the growth of business between the Atlantic-Gulf seaboard and the west coast of South America. For example, it will reduce the distance between New York and Callao 6,250 miles, and between New Orleans and Callao 7,245 miles.

In shipments between our Eastern coast, Australasia and the Orient it competes successfully with the Suez Canal:

New York to	Via Panama	Via Suez	Via Cape Town
Yokohoma........	9,996 (a)	13,566	......
Manila...........	11,548 (a)	11,589	......
Hong Kong.......	11,691 (a)	11,673	......
Melbourne........	10,392	13,385	13,162
Sydney...........	9,811	13,960	13,742
Wellington........	8,851	14,441 (b)	14,333

(a) Via San Francisco. (b) Via Strait of Magellan, 11,344.

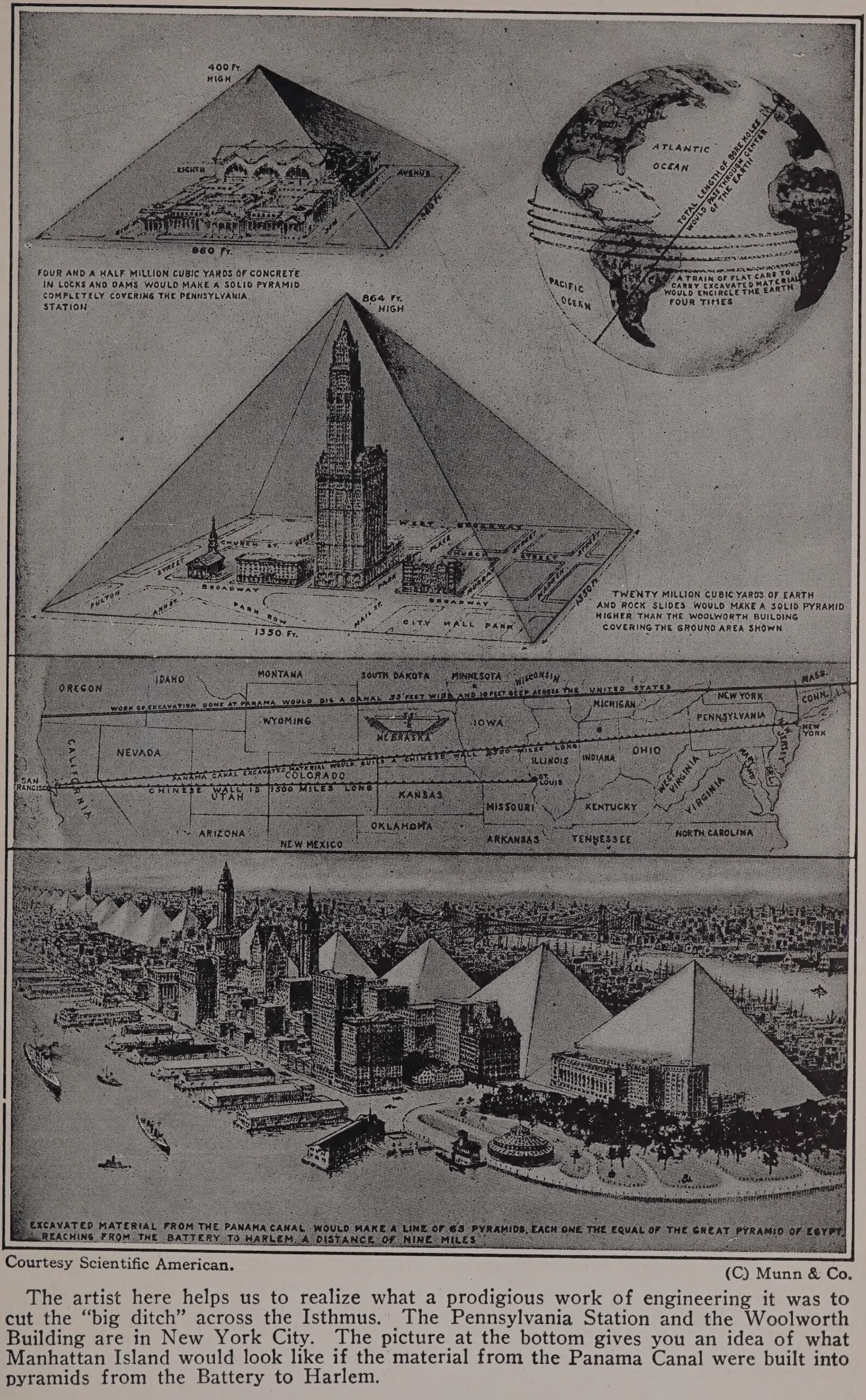
But the greatest benefit to the United States is saving in time and freight charges for shipments to and from our own coasts. The saving in distance between New York and San Francisco is 7,873 miles, and that between New Orleans and San Francisco 8,638 miles. The growth of the entire Pacific Coast with its enormously rich and relatively undeveloped resources will undoubtedly go forward with giant strides, far surpassing even its past record—a great past and a greater future, fittingly expressed in the magnificent Panama Exposition in the City of the Golden Gate.

The Climate of Panama.—The Climate of Panama is tropical, with excessive humidity. The dry season extends from January to April, the wet season from May to December. Mean annual temperature, 80°, with maximum and minimum of 89° and 76°. The hottest month of the year is May. The annual rainfall is 40 to 155 inches, depending on the locality. It is heaviest on the Caribbean coast, and decreases as the Pacific Ocean is approached. Northeast winds prevail during the greater part of the year, being strongest during the dry season. Southeast winds prevail during the wet season. (See LOCK and PANAMA. Consult index for references to important canal systems.)

Pandora (*pan-do'ra*), according to the Greek legend, was the first woman on earth. When Prometheus stole the fire from heaven, Zeus caused a woman to be made to bring trouble to man, and sent her to Prometheus' brother, Epimetheus. A later story relates that Pandora possessed a box in which were all men's ills and troubles, which escaped on the box being opened. Still another story has it that the box contained all blessings, and Pandora, on opening it, allowed all to escape but hope.

Pan'golin, the name given to any one of the scaly ant-eaters belonging to the genus *Manis*. They are mammals, but the shape of their bodies and the presence of scales

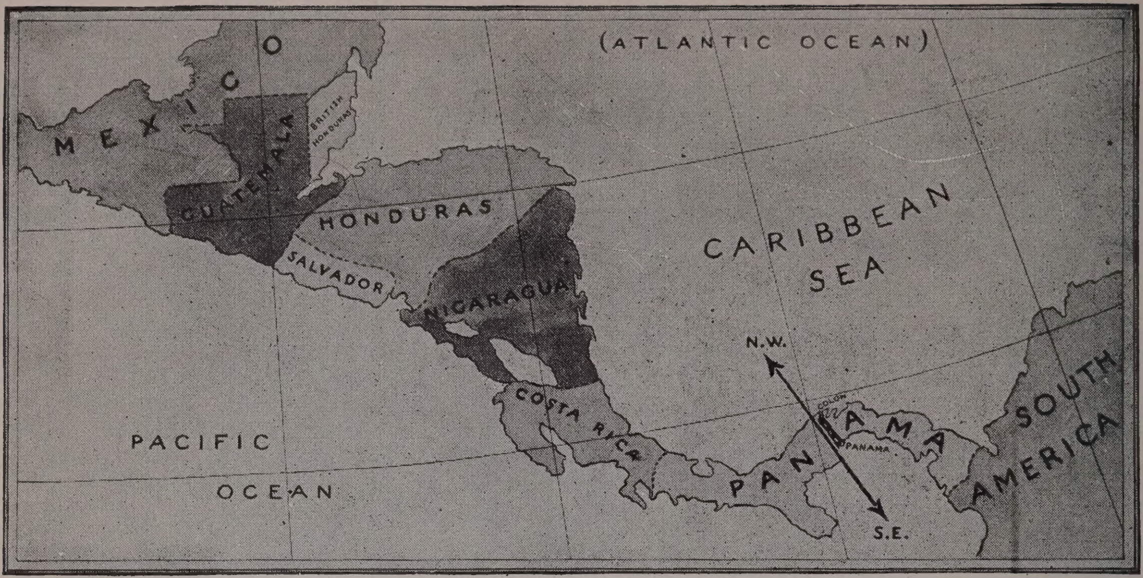
A TRIP THROUGH THE PANAMA CANAL


400 FT. HIGH
EIGHTH
AVENUE
860 FT.
FOUR AND A HALF MILLION CUBIC YARDS OF CONCRETE IN LOCKS AND DAMS WOULD MAKE A SOLID PYRAMID COMPLETELY COVERING THE PENNSYLVANIA STATION
ATLANTIC OCEAN
TOTAL LENGTH OF BORE HOLES WOULD PASS THROUGH CENTER OF THE EARTH
AFRICA
PACIFIC OCEAN
A TRAIN OF FLAT CARS TO CARRY EXCAVATED MATERIAL WOULD ENCIRCLE THE EARTH FOUR TIMES
864 FT. HIGH
WEST BROADWAY
CHURCH ST.
FULTON STREET
BROADWAY
ANN ST.
PARK ROW
MAIL ST.
CITY HALL PARK
1350 FT.
TWENTY MILLION CUBIC YARDS OF EARTH AND ROCK SLIDES WOULD MAKE A SOLID PYRAMID HIGHER THAN THE WOOLWORTH BUILDING COVERING THE GROUND AREA SHOWN
WORK OF EXCAVATION DONE AT PANAMA WOULD DIG A CANAL 55 FEET WIDE AND 10 FEET DEEP ACROSS THE UNITED STATES
PANAMA CANAL EXCAVATED MATERIAL WOULD BUILD A CHINESE WALL 2500 MILES LONG
CHINESE WALL IS 1500 MILES LONG
SAN FRANCISCO
ST. LOUIS
NEW YORK
OREGON
IDAHO
MONTANA
SOUTH DAKOTA
MINNESOTA
WISCONSIN
MASS.
CONN.
NEW YORK
MICHIGAN
PENNSYLVANIA
WYOMING
NEBRASKA
IOWA
CALIFORNIA
NEVADA
ILLINOIS
INDIANA
OHIO
NEW JERSEY
COLORADO
UTAH
KANSAS
WEST VIRGINIA
MARYLAND
DEL.
VIRGINIA
MISSOURI
KENTUCKY
ARIZONA
NEW MEXICO
OKLAHOMA
ARKANSAS
TENNESSEE
NORTH CAROLINA
EXCAVATED MATERIAL FROM THE PANAMA CANAL WOULD MAKE A LINE OF 63 PYRAMIDS, EACH ONE THE EQUAL OF THE GREAT PYRAMID OF EGYPT, REACHING FROM THE BATTERY TO HARLEM, A DISTANCE OF NINE MILES

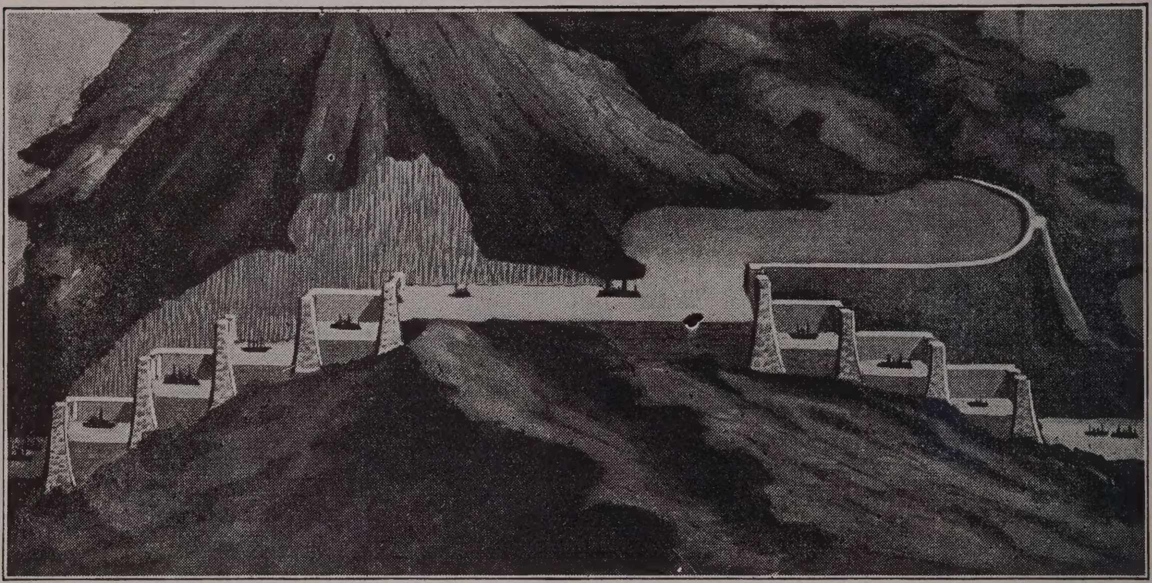
Courtesy Scientific American.

(C) Munn & Co.

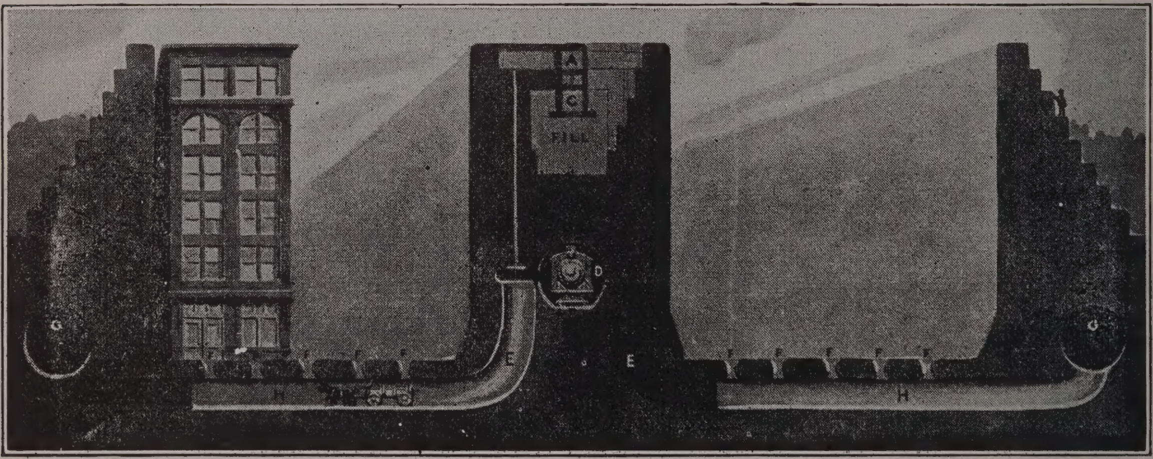
The artist here helps us to realize what a prodigious work of engineering it was to cut the "big ditch" across the Isthmus. The Pennsylvania Station and the Woolworth Building are in New York City. The picture at the bottom gives you an idea of what Manhattan Island would look like if the material from the Panama Canal were built into pyramids from the Battery to Harlem.


(ATLANTIC OCEAN)
MEXICO
BRITISH HONDURAS
GUATEMALA
HONDURAS
SALVADOR
NICARAGUA
CARIBBEAN SEA
N.W.
COLON
PANAMA
PANAMA
S.E.
COSTA RICA
PACIFIC OCEAN
SOUTH AMERICA

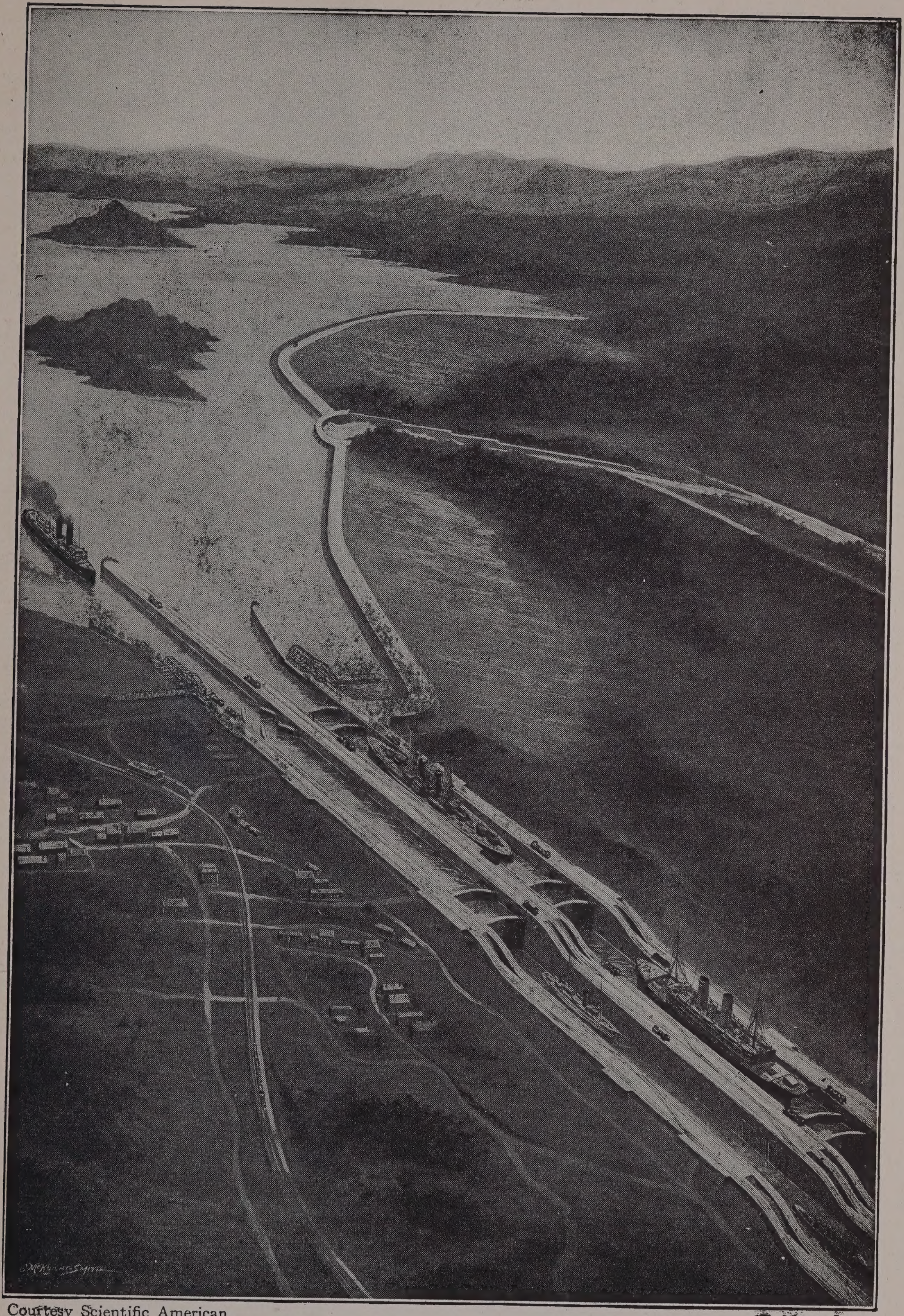
Notice how the "East" end of the Canal may be said to be west of the "West" end. Although connecting our East and West coasts, the Canal runs Northwest and Southeast.



Here are the ocean liners climbing over the mountains by the water stairway. Actual distances not represented. (Hauling system on next page.)


A
B
C
FILL
D
E
E
F
G
G
H
H

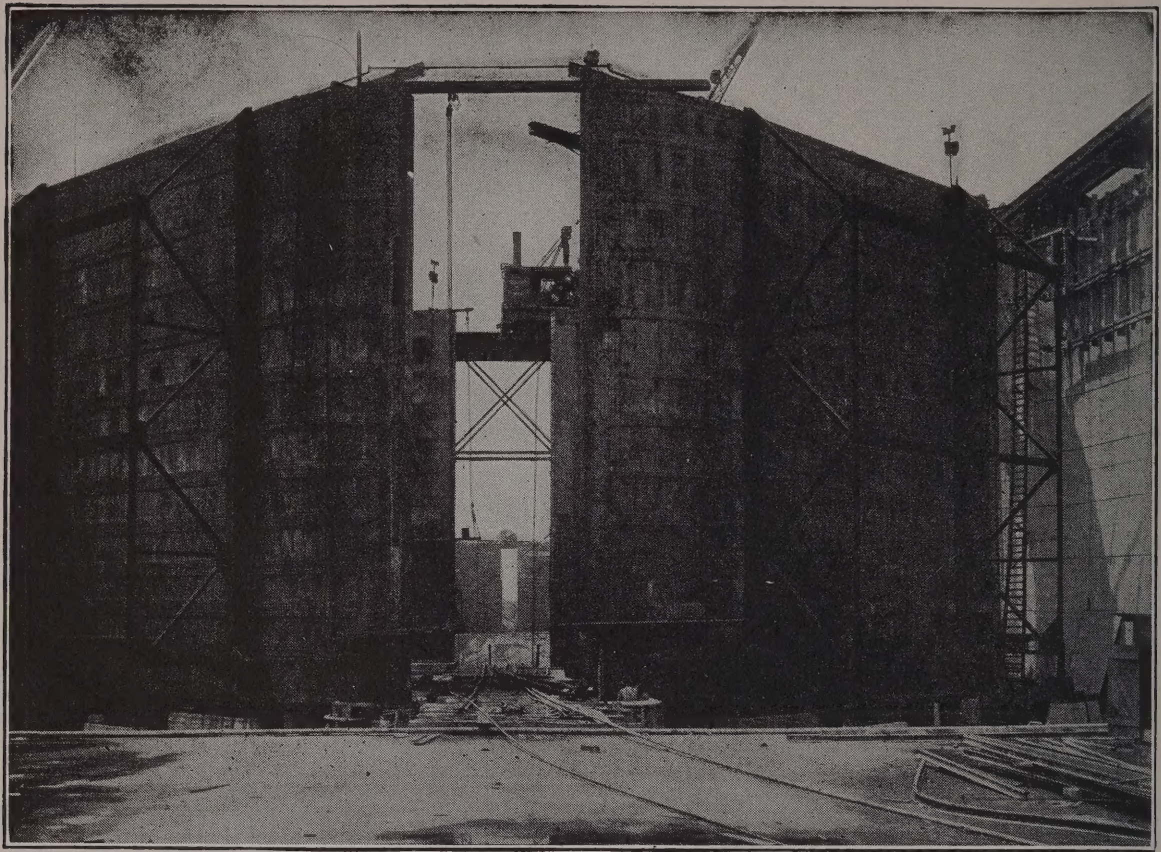
Vessels are raised or lowered by letting water into or out of each lock from the lock above through culverts D G by means of lateral culverts E H, through wells F. (A) passageway for operators, (B) gallery for electric wires, (C) drainage gallery. The locomotive, the team, and the building show the size of a lock.



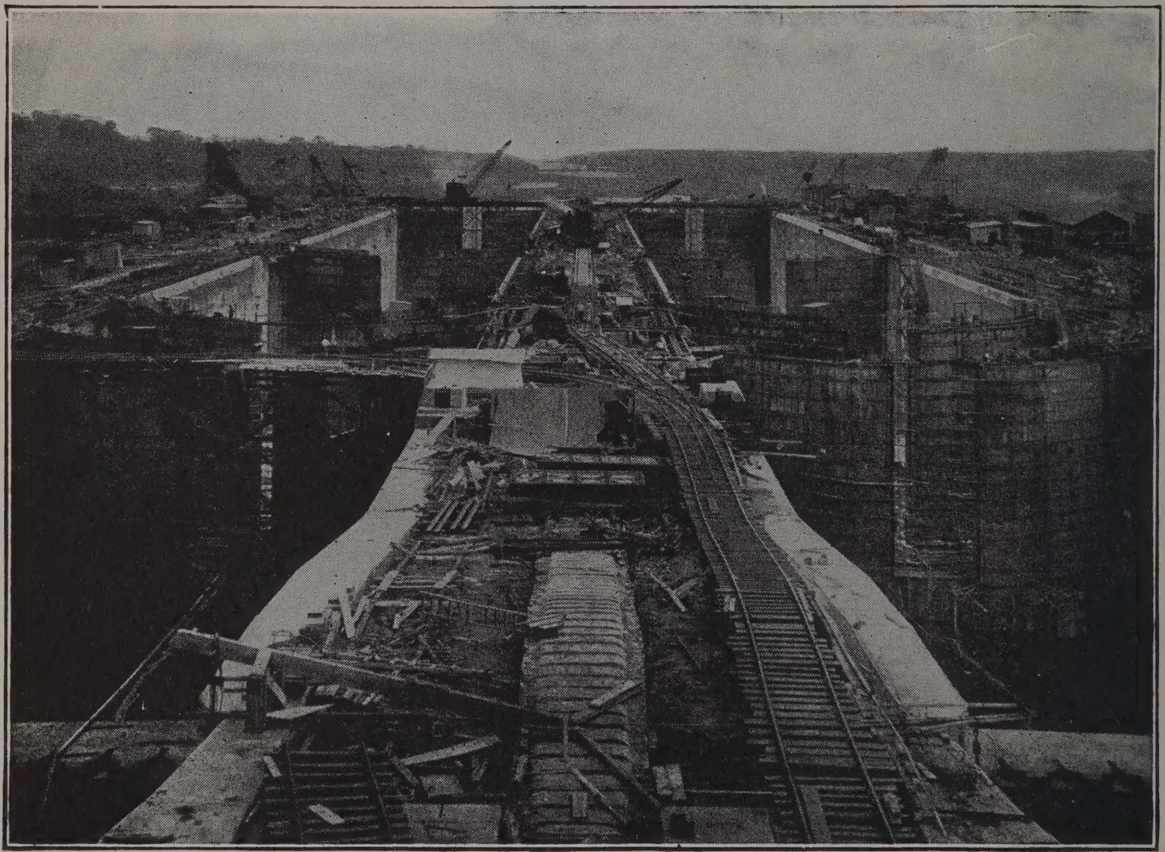
Courtesy Scientific American.

(C) Munn & Co.

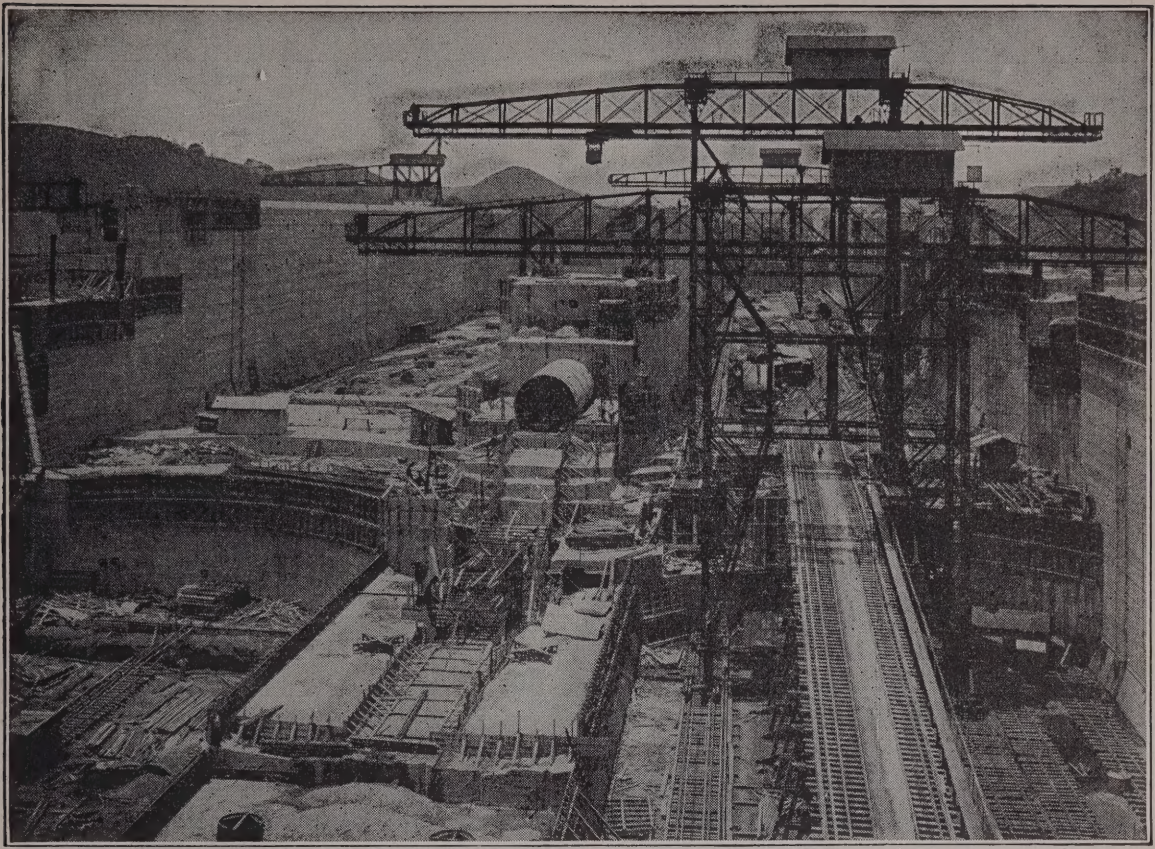
We are looking at the Gatun locks, dam and spillway. Notice the locomotives hauling the ships. The two in the rear are for keeping the vessel steady.



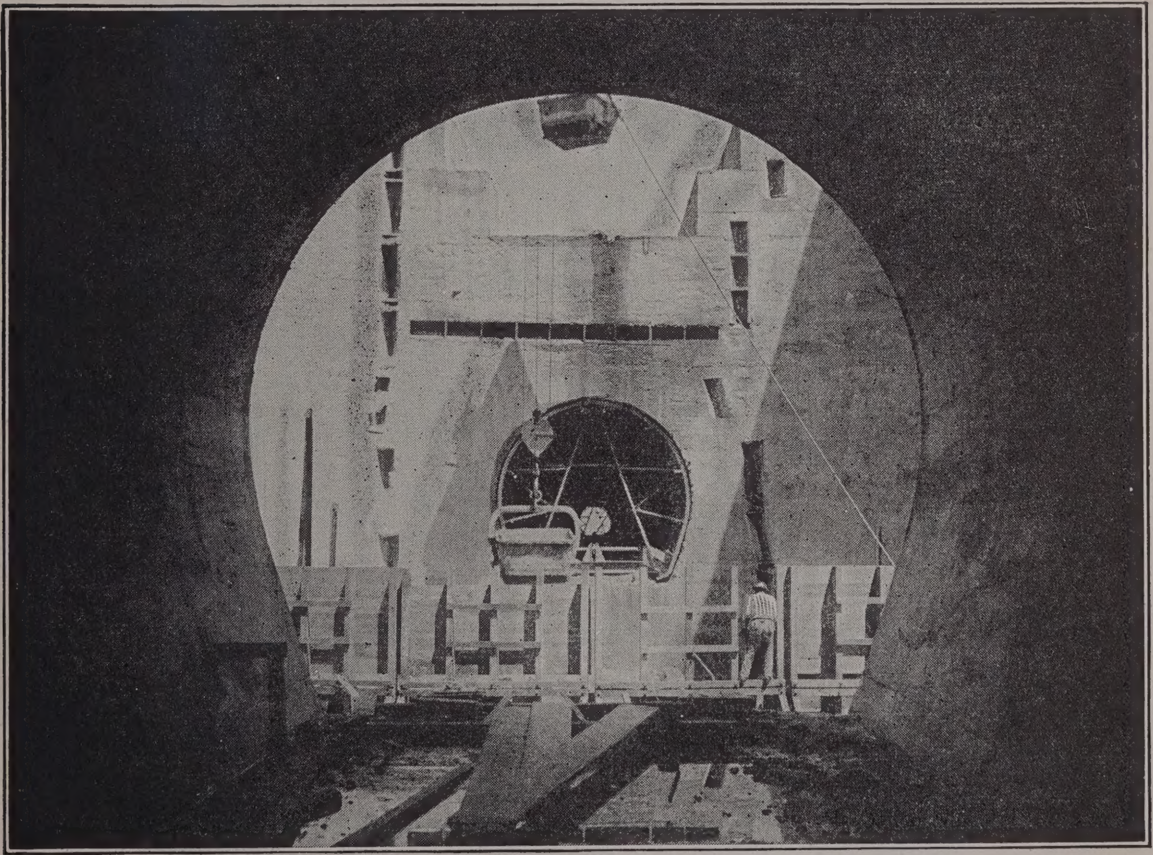
Here we are inside a lock during construction. This inward slant of the great entrance gate helps it to better resist the water pressure.



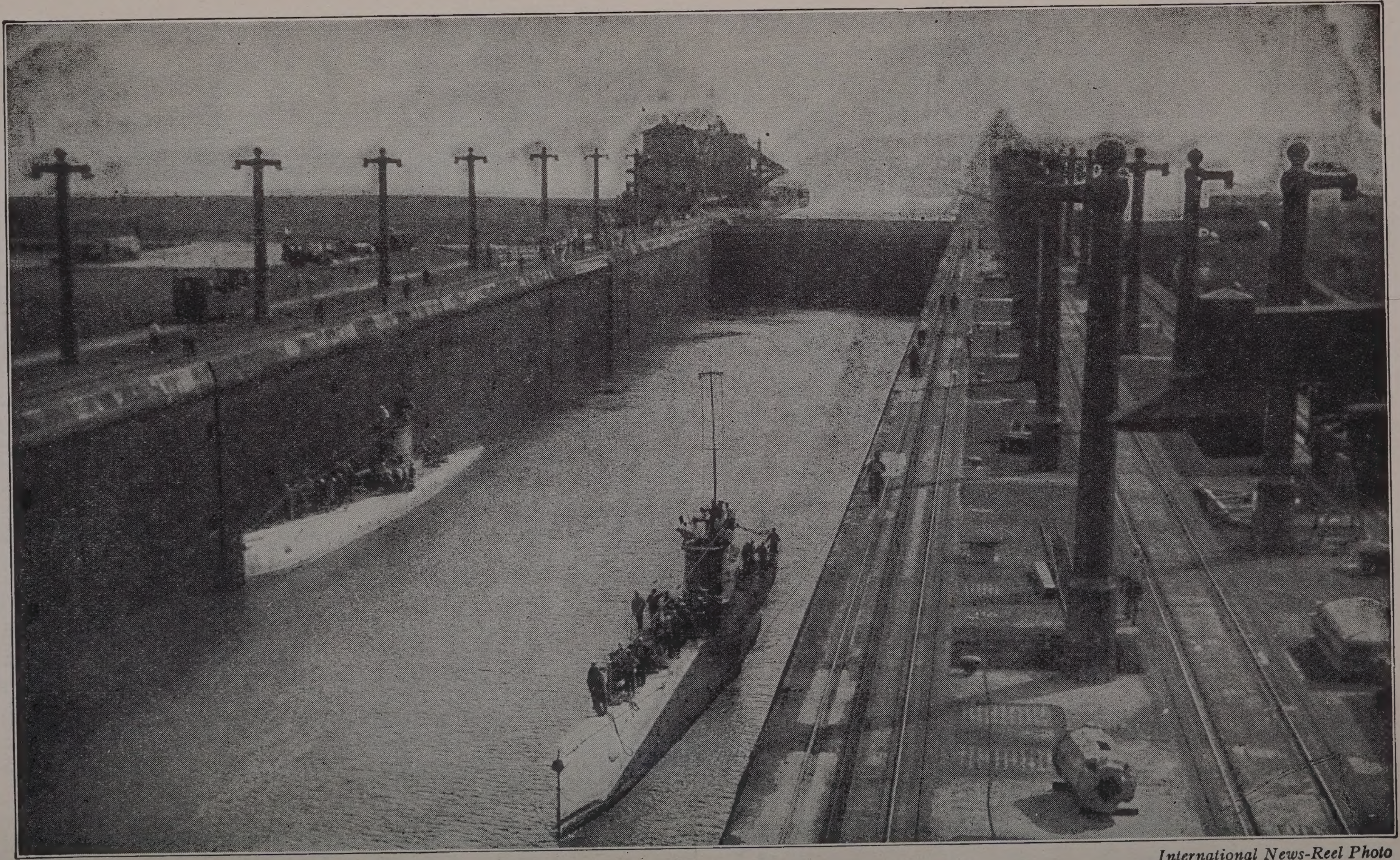
Standing on the railroad track we see the gates which divide the lock into smaller chambers for handling smaller vessels.



Now we are in the upper locks at Miraflores. Notice the culvert in center wall. Next we will have a nearer view of a central culvert.



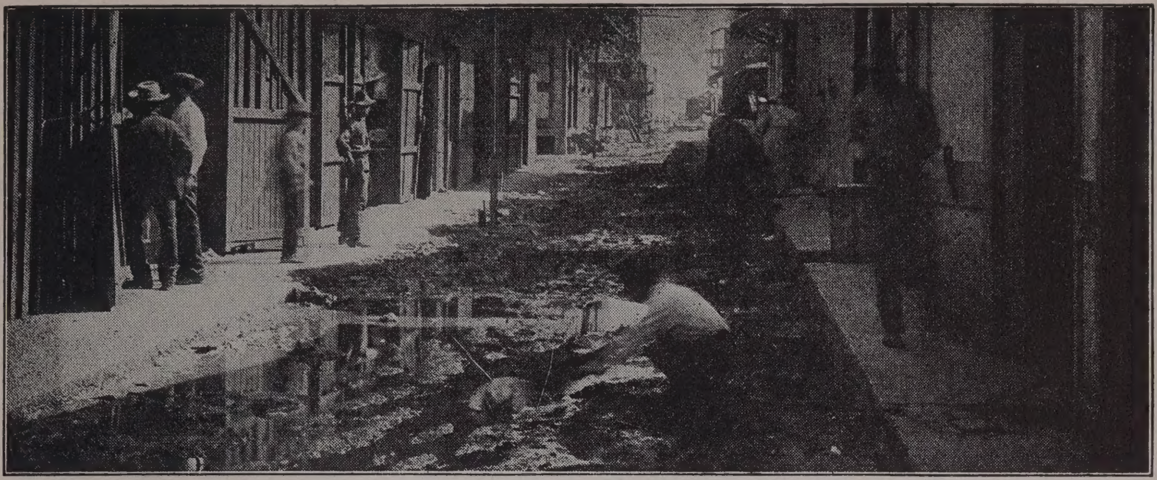
Here we are looking through the central culvert of the Gatun upper locks. Compare its size with that of the workman.



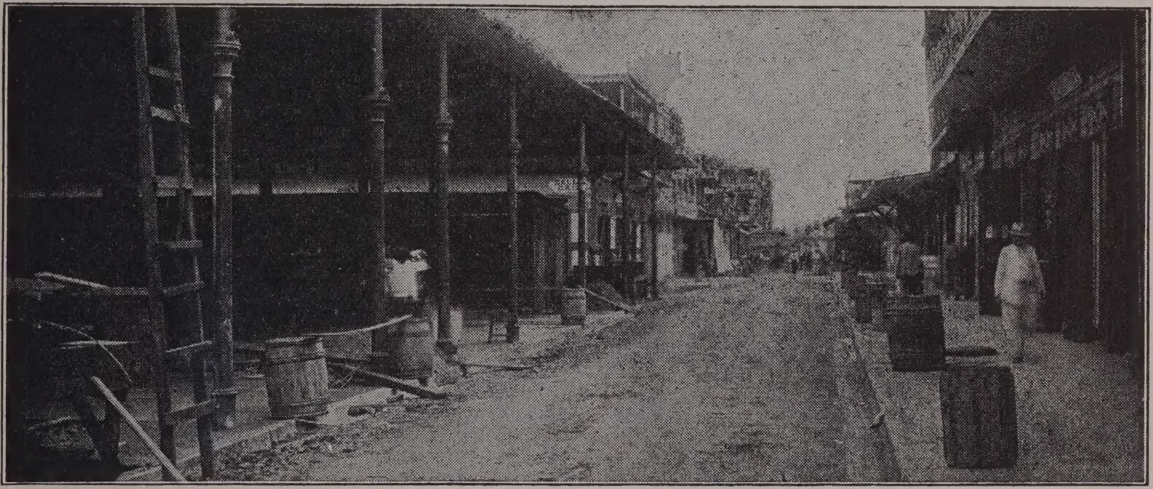
International News-Reel Photo

SUBMARINES GOING THROUGH PANAMA CANAL

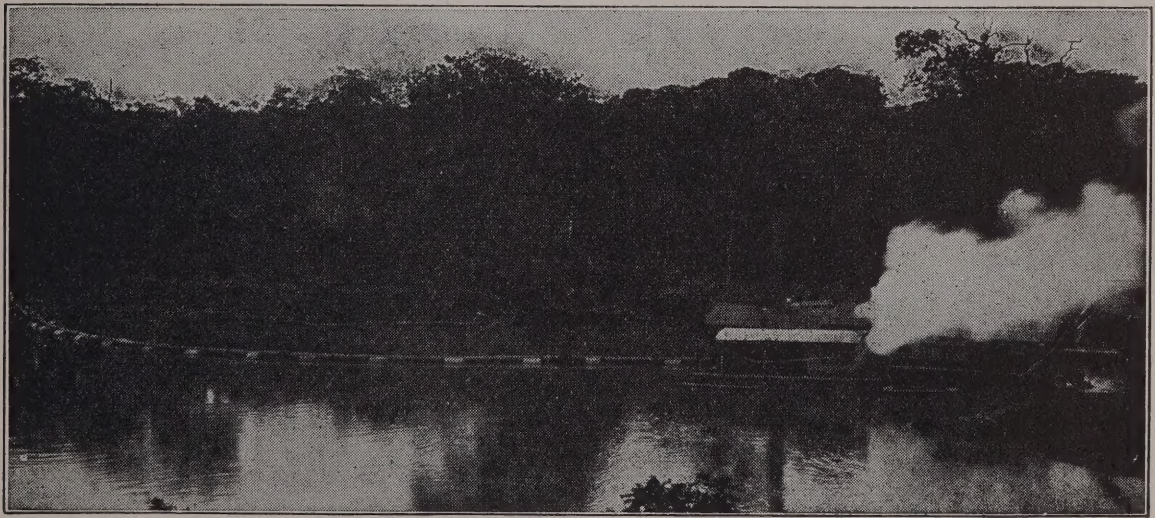
This photograph shows submarines passing through Gatun lock to join the Atlantic Fleet. They appear as pigmies in the big ditch that was dug to accommodate the largest dreadnaughts.



We are looking down "Bottle Alley" (Colon) before the Americans began "house-cleaning." These pools bred the malaria-infected mosquito.



Can you recognize it? This is the same "Bottle Alley" nine months later. It shows what proper draining and paving methods have done.



This dredge is cutting mud out of the Chagres bottom and pumping it, through a pipe line, into a mosquito-infested swamp—two good jobs at one operation.

This is a part of the history of the Canal—French excavating machinery abandoned in 1888. Picture taken in June, 1911.

Here we have two views of the Chagres River—near Fort San Lorenzo on the right and near Los Hornos on the left. Notice how floods have worn the limestone.

give them the appearance of reptiles. The scales are formed of cemented hairs. In some forms the tail is longer than the head and body. They inhabit Asia and western Africa and vary in length from one to five feet. They are burrowing animals and feed mainly on white ants.

Pan′icle, an open spray-like cluster of flowers, consisting of a compound raceme chiefly branching below. See INFLORESCENCE.

Pansy. See VIOLET.

Pan′theon, a temple dedicated to all the gods, has a great arched roof, lighted through one opening in the center of the dome. The Pantheon in Rome is the only ancient building that has been completely preserved. It (or, rather, part of it) was built by Agrippa in 27 B. C. It was consecrated as a church in 610, and is used as a burying place for eminent Italians. The Pantheon of Paris was built in 1764, and is called the Church of St. Genevieve. It also is used as the mausoleum of famous men.

Pan′ther, the name loosely applied to the leopard, but more correctly used for the stouter varieties of that animal. The puma is also called panther in America.

Paoli (*pä′ō-lē*), **Pasquale,** a Corsican patriot, was born in Corsica in 1726; was taken to Naples bv his father in 1739; but returned to his own country to become the leader of the struggle for independence in July, 1755. He would have suceeded but that Genoa sold Corsica to France in 1768. He held out for a year against the French, but on being defeated escaped to England, where he was given a government pension. On the breaking out of the second revolution in France he returned, became lieutenant-general and governor, and set on foot a second rebellion, hoping to form a union with England, but failed and returned to England in 1796. He died near London, Feb. 5, 1807. See Boswell's *Account of Corsica.*

Paper takes its name, properly, from that which was first used in its place and from which it was first made — Egyptian papyrus (*q. v.*). It was first made by laying thin slices of the cellular tissue across others, the whole moistened with Nile water and pressed, then smoothed down with ivory or shell. In our 10th and 11th centuries it was made of other fibrous matter. The Chinese Encyclopedia says that the Chinese first wrote on thin strips of bamboo board, but for 300 years before and after Christ silk-waste was used. The Chinese statesman, Ts'ai Lun, was the inventor of paper made of vegetable fiber. In A. D. 105 he had paper made of bark, hemp, rags and old fishing nets. The first manufacture of rag-paper in Europe was in Spain under the Moors in 1154, but soon afterwards it was made in Italy, France and Germany. It came into universal use in the 14th century. The vegetable fibers from which paper can be made are wood, bamboo, jute, straw corn-stalk, flax and hemp, besides linen and cotton rags for white paper. The great bulk of the paper used to-day is made from wood, and of this the better grade is made by what is known as the sulphide process. It may be briefly described as follows:

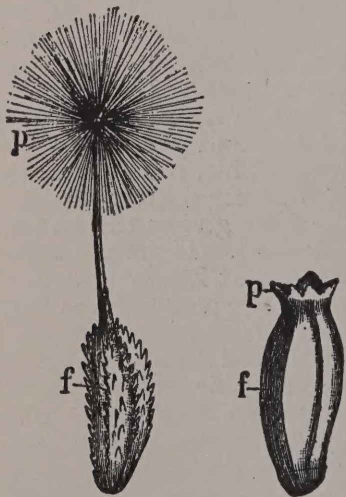
The ground wood-pulp is made chiefly from spruce and has been saturated with sulphurous acid, though poplar-pulp is cooked in caustic soda. Then an oval shaped tub whose capacity is about 1,000 pounds is fed with one part of sulphite pulp and three of ground wood-pulp. A small percentage of some mineral; saponified rosin; coloring matter; and alum are added. This pulpy mass is thoroughly mixed, and then passes into a refining engine. After leaving the refiner, the pulp is screened. Then it is pumped on the paper-machine proper, having been so thinned that it behaves like a fluid. The paper-machine has a wet part and a drying part. The wet part forms the paper and gives it the consistency that makes it paper. The drying part increases this consistency, dries the paper and gives what is called surface. The liquefied pulp flows from a box at the head of the machine over an apron and upon an endless, horizontal, wire cloth moving forward continuously. The water in the pulp drains through the wire and the fibers settle on the wire. The fibers become so compacted that they are separated from the wire, and these compact sheets or felts are conveyed to presses, two or three in number, consisting of pairs of massive rolls. Between these passes the paper, supported, however, by endless felts of wool, because the paper can not yet support itself. After this it can, and enters the driers, 20 or 30 cylinders three or four feet in diameter, one horizontal tier of driers being above the other. The paper passes partially round each drier, going alternately from one to the other tier, and being heated by the steam that is constantly passing through the inside of the cylinders. The paper usually reaches the driers with 70% of water in it still. Then it goes through the calenders,—rolls with polished surfaces. These rolls are arranged in a stack, and the paper goes in at the top and passes out at the bottom to the reel. This, practically, is an ironing process, the regulation of the pressure between the rolls giving the paper whatever surface is desired. Light pressure leaves the surface open, but heavy pressure closes the pores. When the paper leaves the calenders and is reeled, it is considered made.

The first mill in the United States was built in 1690 where Philadelphia now stands, and today the paper output in America is the largest in the world, being over 4,200,000 tons a year. The U. S. Census Bulletin of Manufactures gives the following figures: Number of establishments 777; wage earners 75,978; cost of materials used $165,442,341; value of products $267,656,964. Over 1,241,900 tons of wood pulp were used, and 983,882 tons of paper and 357,470 tons of rags (including cotton, flax waste etc.). Next in order is England, then come France, Germany, Austria and Italy. See works on *Paper and Paper Making* by Hoffman, Munsell, Archer and Dunbar.

Papier-Maché (*pȧ'pyā'mä'shā'*), a name applied to paper pulp, pressed and treated to resemble wood or plaster. Articles made of the pressed-pulp or of sheets of paper pasted together on a mold were first made in Persia and Kashmir in the shape of small cases, boxes and trays. In Japan helmets were often made in the same way. In the 18th century Martin began the manufacture of peculiarly varnished papier-maché snuffboxes in France, and in 1772 Henry Clay, an Englishman, received a patent for the preparation of sheets pasted together, forming door-panels, tables, cabinets and trays. The tray of sheets is formed on the mold, heated and dipped into a mixture of linseed oil and tar, then placed in the stove and afterward planed and filed. Then it is given several coats of tar and lampblack, after which it is varnished and polished by hand. The papier-maché combination has been used for doors, water-pails and even for car-wheels with success.

Pappenheim (*päp'pen-hīm*), **Gottfried Heinrich,** Count von, a great imperialist general in the Thirty Years' War, was born on May 29, 1594, at Pappenheim, Bavaria, and at 20 went over to the Roman church. He served under the king of Poland against the Russians and the Turks, and then joined the Catholic league, defeating the Bohemians at Prague in 1620. Again in the Austrian service, he (1626) suppressed the peasant revolt, in which 40,000 peasants died, and then fought against the Danes, Swedes and Saxons of the Protestant league. At Lützen (1632) he arrived in time to save Wallenstein from defeat by the Swedes, but was mortally wounded in the second charge and died at Leipsic, Nov. 17, 1632, pleased that Gustavus Adolphus had died just before him.

Pap'pus (in plants), the highly modified calyx of the flowers of the *Compositæ*. As the flowers are epigynous (which see), the pappus appears to rise from the summit of the seed-like fruit (akene), and occurs in a great variety of forms. Sometimes it is a tuft of delicate hairs, as in the thistle and dandelion; sometimes two or more tooth-like and often barbed processes, as in tick-seed, beggar's ticks and Spanish needles; sometimes beautifully plumose bristles, as in the blazing star; sometimes simply a cup or crown; and sometimes wanting altogether. In general, the pappus is developed to aid in the transportation of the akenes by wind or animals.



Two forms of pappus (p) borne at the summit of akenes (f).

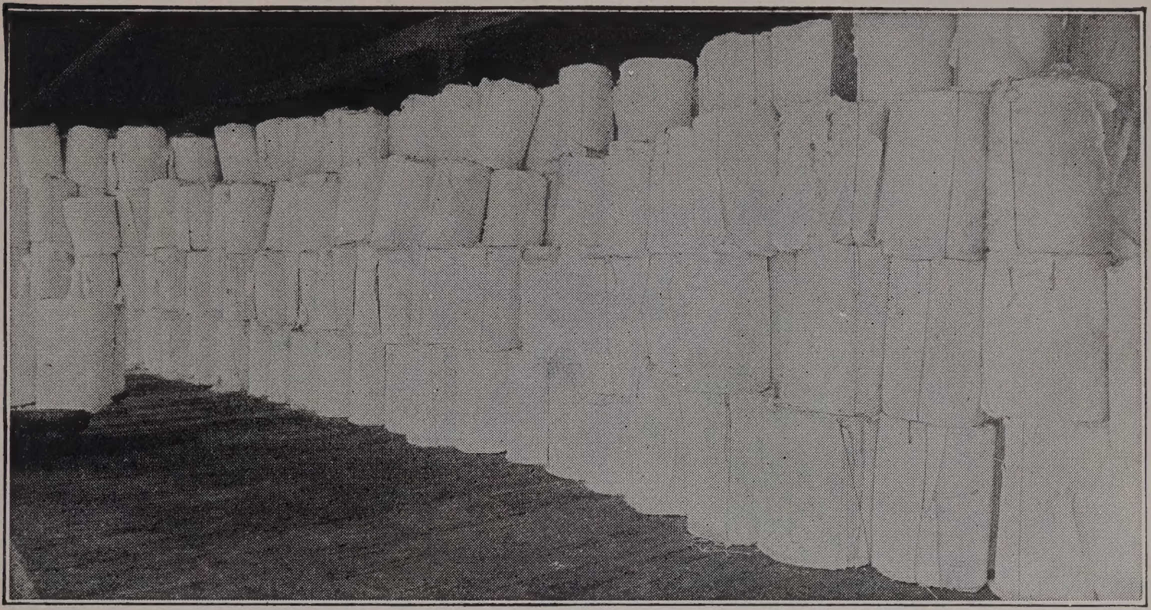
Papua (*păp'ŏŏ-ȧ*). See New Guinea.

Papy'rus, a species of the genus *Cyperus*, which belongs to the sedge family, and contains over 600 species distributed throughout the temperate and tropical regions. The papyrus is *C. papyrus*, and is native to Egypt and Palestine. It is of interest in connection with its ancient use by the Egyptians. "The pith-like tissues of the larger flowering stems, cut into thin strips, united by narrowly overlapping margins, and then crossed, under pressure, by a similar arrangement of strips at right angles, constituted the papyrus of antiquity." It is commonly cultivated in aquaria or in damp soil. The stem is tall and stout, from four to eight feet in height, and bearing at the summit a rosette of drooping leaves. It scarcely occurs in Egypt now, but grows at Syracuse, Sicily. See Paper.

Pará (*pȧ-rä'*), a city of Brazil, is 70 miles from the mouth of the river Pará. It has a fine harbor, sheltered by wooded islands, which admits large vessels. It is closely built, with narrow streets, well-shaded by mangoes and palms. It has street-cars and telephones, and among its public buildings are a theater, custom house and cathedral. Here are the headquarters of the Amazonian Steamboat Company, which has most of the Amazon River trade, supplying the interior towns with foreign goods and exporting india-rubber, cacao, Brazil nuts, palm fibre, tonka beans, deerskins and annato, a kind of dye. Pará also is a state or district with an area of 443,903 square miles and a population of 445,356. Consult *Around South America* by Vincent. See Amazon and Brazil.

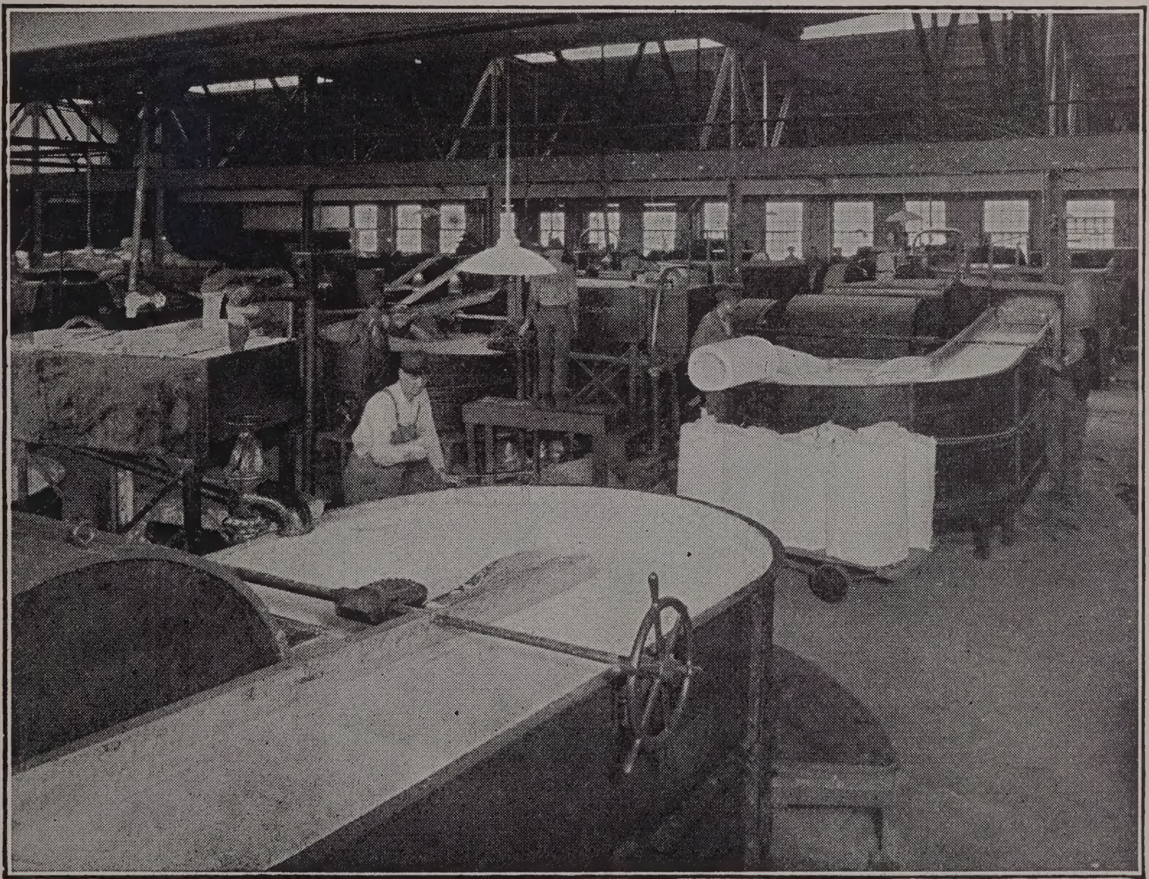
Par'adise Lost. This is the principal poem of John Milton (*q. v.*) and is universally regarded as one of the greatest masterpieces ever produced, ranking with the *Iliad* the *Odyssey*, the *Æneid*, the *Divina Commedia* and *Faust*. It was published in 1667, and was composed after Milton had become blind and had retired from political life. From the sale of the poem its author realized ten pounds and his widow eight pounds in addition. *Paradise Lost* is an epic in twelve books. It deals with the Biblical account of the fall of man, and proposes to reveal the divine purpose that governed that tragedy. Milton describes Satan, the fallen angel and his legions in hell. Instead of struggling again for the mastery of heaven, they decide to attempt to corrupt the newly created

HOW FORESTS ARE TURNED INTO PAPER



Courtesy The Champion Coated Paper Co., Hamilton, Ohio.

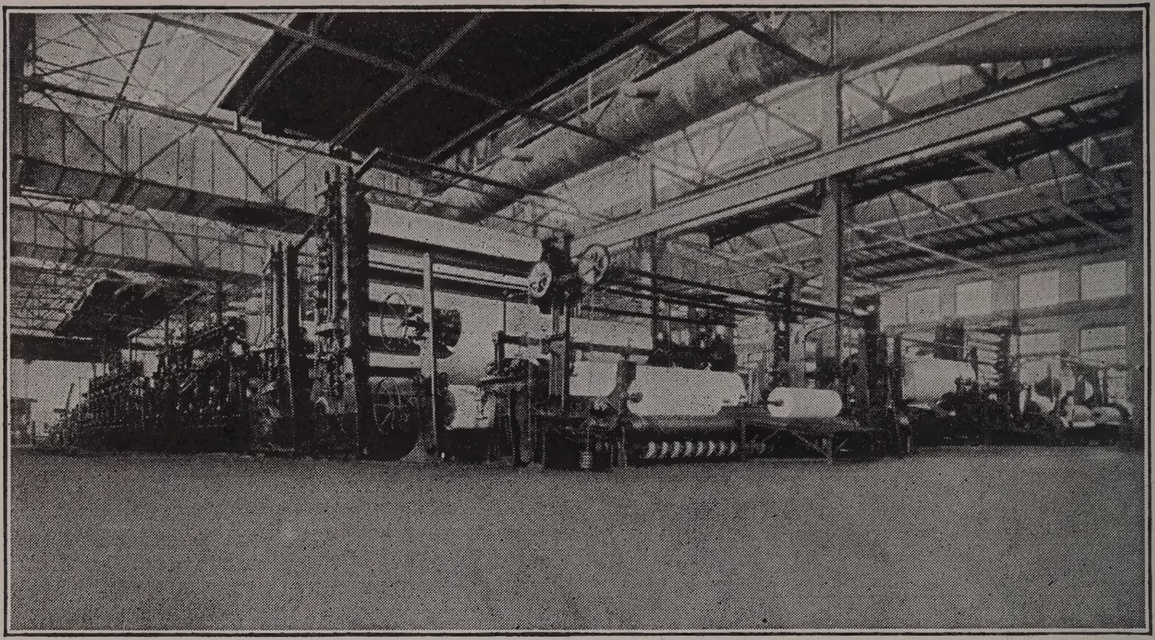
These bales are composed of wood pulp. Spruce and other kinds of trees are ground very fine, the small particles "cooked" and put up in bales.



Courtesy The Champion Coated Paper Co., Hamilton, Ohio.

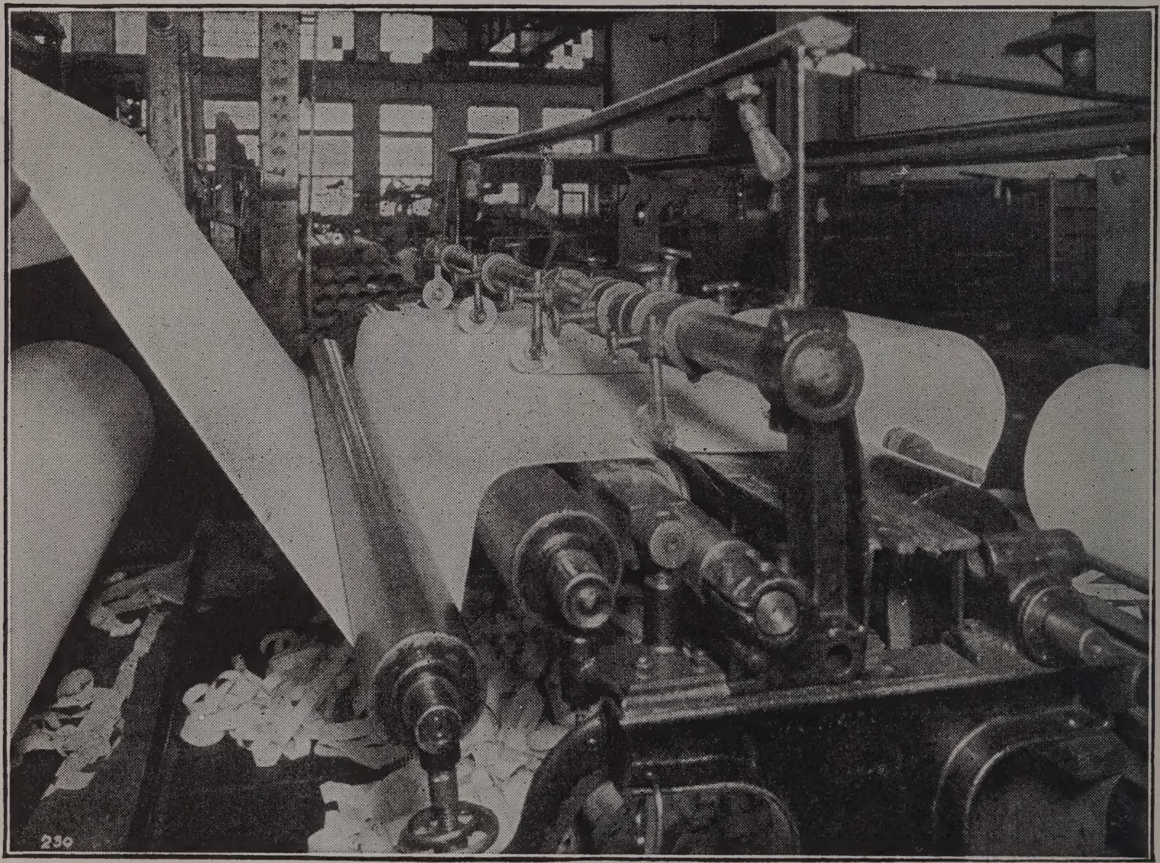
Wood pulp being beaten in great vats, with a large quantity of water. One man in the picture is feeding the wood pulp in a vat. After many hours the pulp looks like skimmed milk.

HOW FORESTS ARE TURNED INTO PAPER



Courtesy The Champion Coated Paper Co., Hamilton, Ohio.

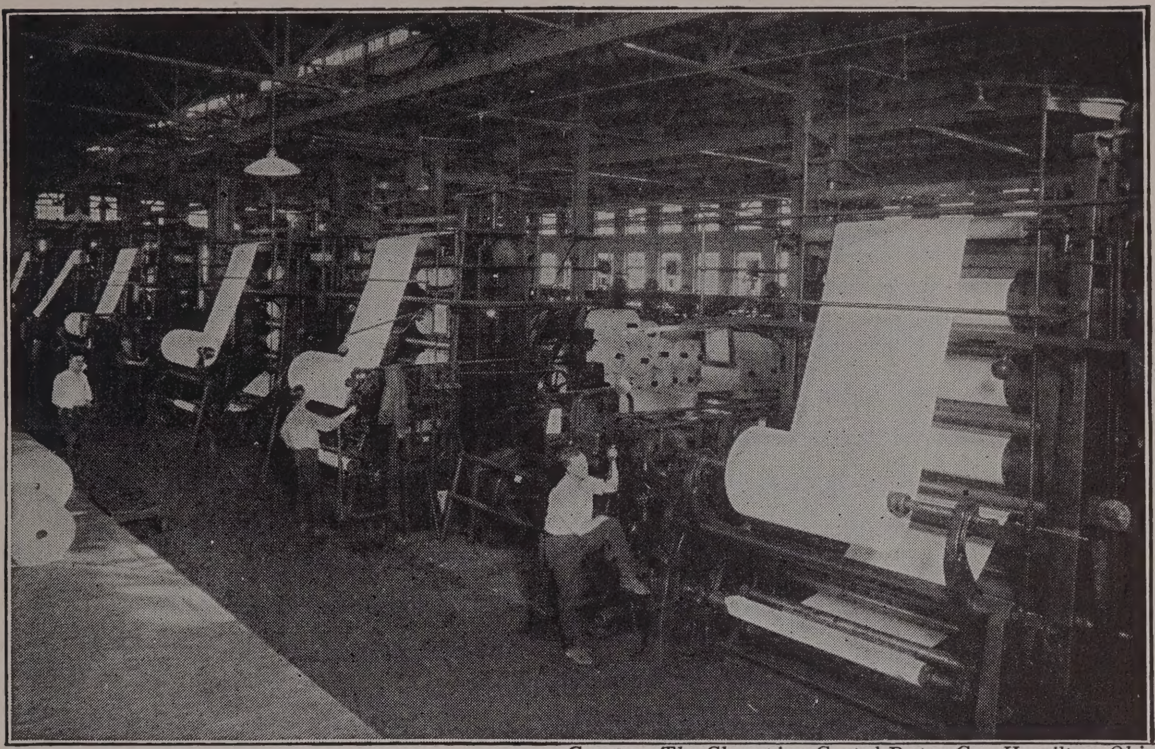
From the vats the pulp is put on a draining screen, and then fed into this machine, where, between a long series of rollers the pulp is gradually pressed and dried into sheets of paper.



Courtesy The Champion Coated Paper Co., Hamilton, Ohio.

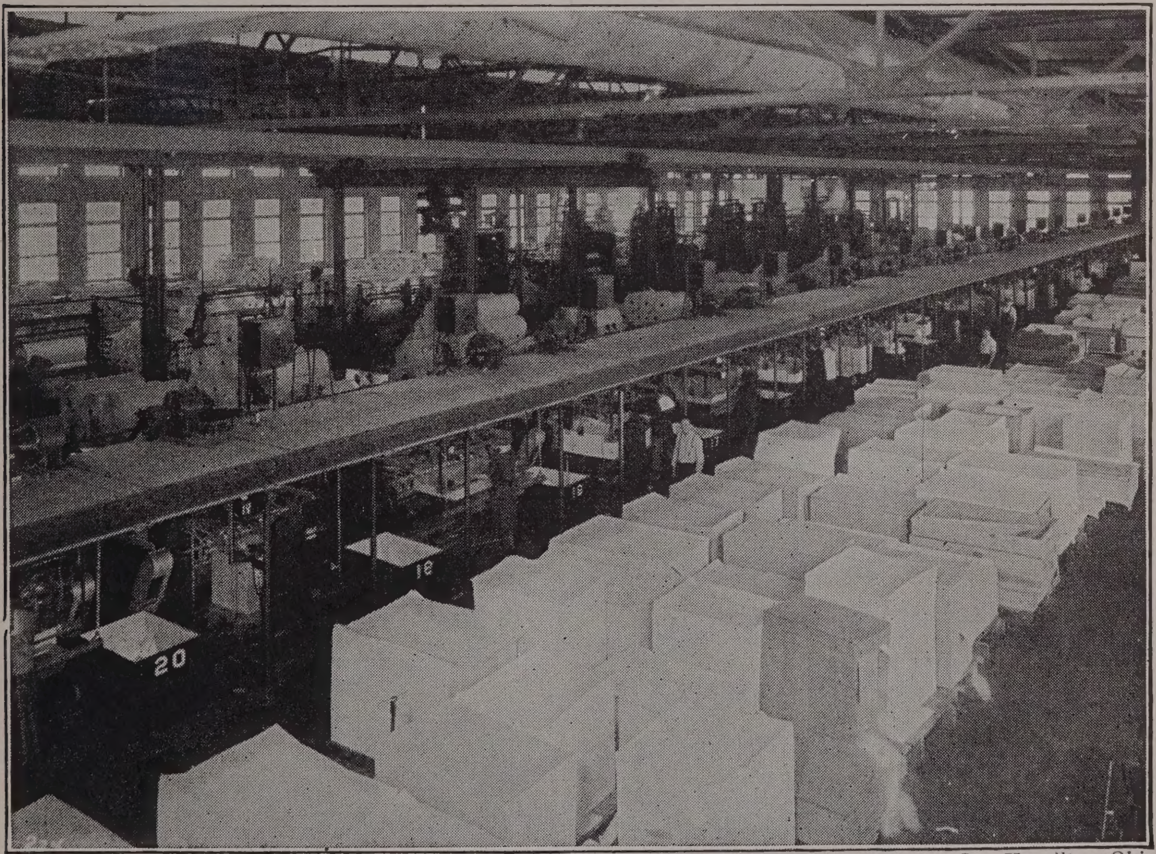
This is a close-up view of the paper going over and under the final rollers, and being wound on spindles, in which form newspapers and magazines buy the paper.

HOW FORESTS ARE TURNED INTO PAPER



Courtesy The Champion Coated Paper Co., Hamilton, Ohio

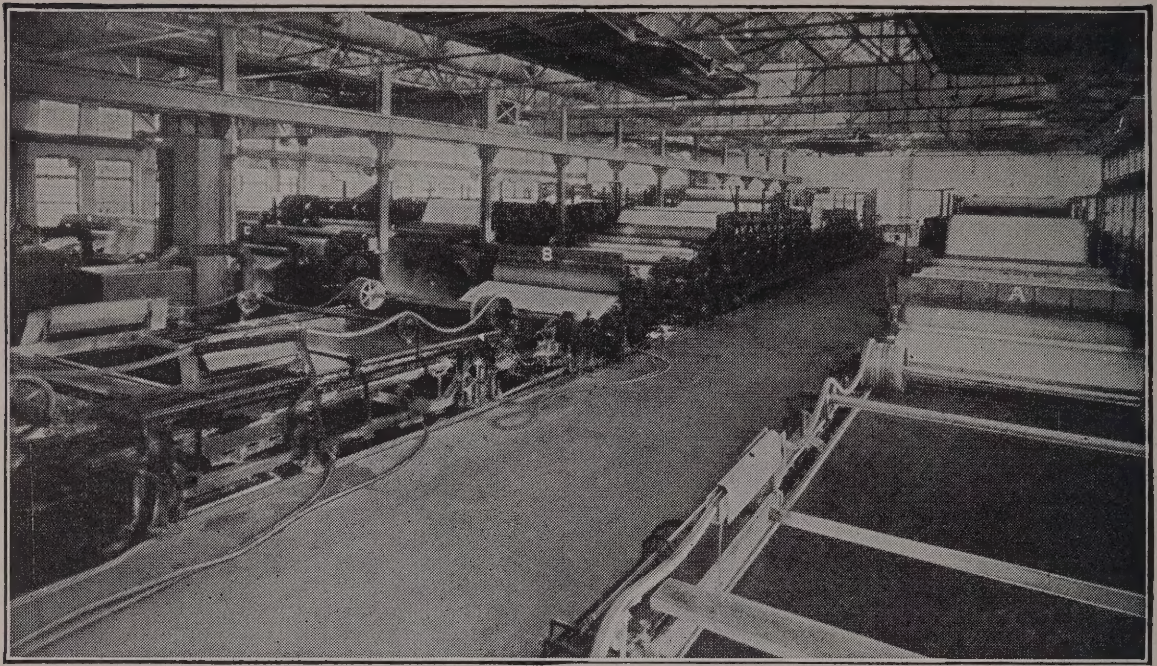
These machines are called calender stacks. After the paper has received a coating of "filler" it is run through these rollers, where friction "burns in" the coating, and gives the paper a gloss.



Courtesy The Champion Coated Paper Co., Hamilton, Ohio

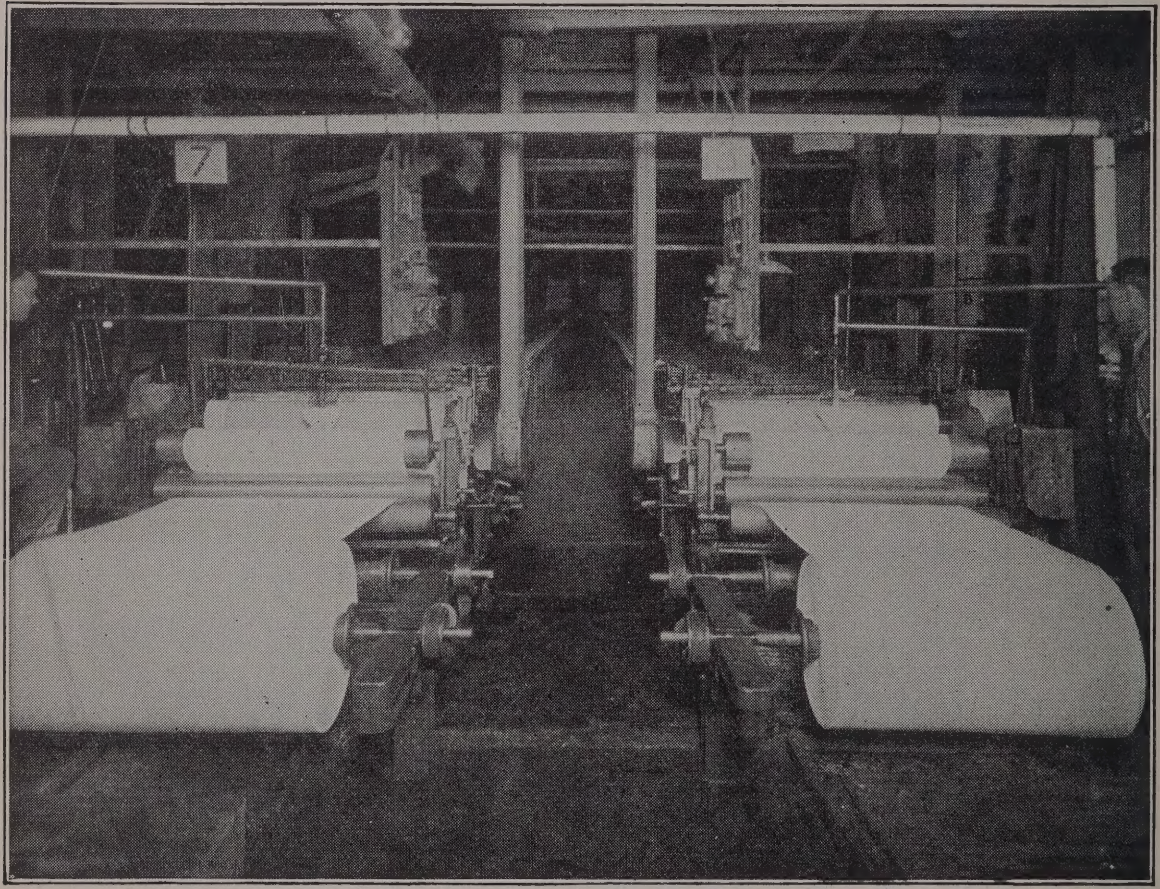
A long line of paper-cutting machines which cut the spindles of paper into commercial lengths.

HOW FORESTS ARE TURNED INTO PAPER



Courtesy The Champion Coated Paper Co., Hamilton, Ohio

Another view of the paper rollers. Each roller weighs more than an automobile. They are adjusted within a hair's breadth, so the sheets will be of the same thickness. This picture gives an idea of the length of the machines.



Courtesy The Champion Coated Paper Co., Hamilton, Ohio

Here are two coating machines in action. Some papers are glossy, like the paper on which these pictures are printed. These machines give the paper a thin coating of "filler" which is dried rapidly.

Adam and Eve. Satan undertakes this task, and, since God permits, he succeeds, although man is warned of the danger by Michael, the archangel, who relates to Adam and Eve the history of Satan and his expulsion from heaven. Adam and Eve eat the apple and fall into wretched quarrels and despair. They are expelled from Paradise, but are comforted by the revelation of the redemption of man through Christ. The poem contains many elaborate and abstruse theological discussions, and is characterized by the most erudite scholarship. These qualities make it tedious to many, but, on the other hand, majestic descriptions and brilliant imagery abound, and the grandeur of the style is everywhere sustained. Matthew Arnold commends it to English readers as our best example of the classic or grand style.

Paraffin (*păr'ăf-fĭn*), the name given by Baron Reichenbach to a white, transparent substance obtained by him from wood-tar in 1830. Christison, an English chemist, obtained the same substance about the same time from petroleum and called it petroline, and Dumas, the French chemist, obtained it from coal-tar in 1835. Not until 1850, however, was it manufactured, and it is now used almost entirely for the making of candles and in some branches of the arts and surgery. It is made largely from petroleum shale by the following process: The shale is broken and placed in a retort, is then distilled and treated with chemicals, after which it is cooled. The paraffin separates as a solid, and the heavy oil mixed with it is pressed out. Then the crude paraffin is treated with naphtha, and the naphtha removed by further pressing after it has cooled. The paraffin is then melted and allowed to run through filters into convenient shapes. Paraffin is obtained also from mineral wax and from the higher boiling portion of ordinary petroleum (*q. v.*).

Paraguay (*pä'rȧ-gwī* or *păr'ȧ-gwā*), a republic of South America, is divided by the river of the same name into eastern Paraguay or Paraguay proper and western or Chaco Paraguay. The eastern part is bounded on the north by Apa and Estrella Rivers, on the east by Amanbay Mountains and Paraná River and on the south by the same river. The boundaries of western Paraguay have not been fully determined. The total area is about 98,000 square miles, and the population, made up of white descendants of the Spanish, of 50,000 Indians, of negroes and of mixtures of all, is 752,000.

Surface and Climate. The Amanbay range runs north and south and divides the basins of the Paraguay and Paraná, whose small tributaries frequently overflow. The northern portion of the country is hilly, broken by palm-dotted plains, but the southern part is one of the most fertile regions of South America. The climate is semitropical. The summer months of December, January and February have a mean temperature of 80.56°, autumn (March, April and May) 72.23°; winter (June, July and August) 64.7°; and spring (September, October and November) 72.7°. Rainfall is abundant, averaging 52.44 inches at Asuncion, and is heaviest during the summer.

The Paraguay Central, 155 miles long, is the only railway. Paraná and Paraguay Rivers, with their interlines, afford water transportation from all parts of the country to the sea. Asuncion enjoys direct communication with France, and a Buenos Aires-New York steamship line provides monthly service from Buenos Aires to Asuncion and is about to extend it to Matto Grosso in Brazil. There are 1,130 miles of telegraph.

Cities. The chief cities are Asuncion, the capital, chief port and commercial center, population 84,000; Villa Rica, population 26,000; and Concepcion, population 15,000.

Resources. Paraguay has a wide area of rich agricultural land, producing corn, coffee, rice, cocoa, indigo, tobacco, manioc and sugarcane. The great forests furnish logwoods, india-rubber and *yerba maté*, a shrub known as Paraguay tea, which is in general use in South America; also a great variety of woods, many of which are exported. On the grazing lands there are 5,500,000 cattle, 214,060 sheep, 190,416 horses, mules and asses. Oranges are so abundant that they are shipped to Brazil for fattening hogs. There are deposits of gold, copper, iron ore and other minerals, but they have not been developed.

Government. The president is elected for four years and is ineligible for a succeeding term. There are two houses of Congress, a cabinet, a supreme court, two courts of appeals and minor courts.

History. The country was discovered by Juan Diaz de Solis in 1515, and the first colony founded by Mendoza in 1535, who built Asuncion and subjected Paraguay to Peru. It fell into the hands of the Jesuits, who administered its affairs until 1768, when they were expelled. In 1810 it declared its independence and elected a dictator, who held office from 1814 to 1840. Under the new constitution of 1844 Don Carlos was elected president and was succeeded by his son in 1862. This son led the war with Brazil, Argentina and Uruguay, and was killed in battle, March 1, 1870. A new constitution, providing for two houses of Congress, was proclaimed on Nov. 25, 1870, upon which was begun the new presidential term of four years. At Asuncion there is, besides a state college, an agricultural school and model farm. See *History of Paraguay* by Washburn and Vincent's *Around South America.*

Paraguay, a river of South America, rises in the Brazilian state of Matto Grasso, and flows southwesterly into the Paraná. Its largest tributaries are the Jauru, Cuyabá, Tacuary, Mondego, Apa, Pilcomayo and Vermejo. The river is 1,800 miles long, and is navigable to the mouth of the Cuyabá. It was declared open in 1852, and now has steamers running upon it, carrying mail from Rio Janeiro to Cuyabá. At its outlet the Paraná (*q. v.*), with its tributaries, forms the large estuary of Rio de la Plata (*q. v.*).

Parallax (*păr′al-lăks*), an optical and astronomical term used to denote the change in direction of an object due to a change in the position of the observer. This phenomenon is, perhaps, most easily observed in viewing a landscape from a railway train. When one's attention is concentrated upon any point in the landscape, all the more distant points appear to move in the same direction as the train, while the nearer points appear to move in a direction opposite that of the train. Thus, as the observer continually changes his position, being on the moving train, the direction of the point to which his attention is directed is continually changing. In the same way, if one could suddenly step from Chicago to New York on any moonlight night, the position of the moon among the fixed stars would also suddenly change. Since the earth is rotating and carrying the observer with it, the position of the moon or of one of the planets among the fixed stars depends upon the hour of the day at which the observation is made as well as upon the latitude and longitude of the observer. Accordingly, astronomical observations of this kind are all "reduced" to the center of the earth; that is, the position of a heavenly body is given as that which it would appear to have for an observer situated at the center of the earth. Parallax of this kind is called *diurnal.* There also is a parallax due to the motion of the earth in its orbit about the sun; this is known as *annual* parallax, because it goes through all its changes in the course of one year. The principle of parallax is one of great usefulness in adjusting certain optical instruments and in making certain optical measurements. See Young's *General Astronomy*.

Paramaribo (*păr′ȧ-măr′ĭ-bō*), the capital of Dutch Guiana, lies on the Surinam, about ten miles from its mouth. It has broad streets, wooden houses, a governor's palace, a court of justice, two forts and a park. Almost all the trade of Dutch Guiana (*q. v.*) is centered here. Population 34,085.

Paraná (*pä′rȧ-nä′*), a large South American river, rises as the Rio Grande about 100 miles northwest of Rio de Janeiro. Flowing northwest and west, it unites with the Paranahyba, and receives its name and flows southwest and south to the point where it is joined by the Paraguay. It then flows through Argentina, uniting with the Uruguay to form Rio de la Plata. Its total length is nearly 2,000 miles, and it drains over 1,100,000 square miles of territory. Its longest tributaries are those named and the Mogy Guassu, Tieté Paranapanema, Ivahy, Iguassu and Salado. It is navigable for 705 miles, and has rapids over 100 miles in length immediately above the junction with the Iguassu. Paraná also is a state of Brazil with an area of 85,430 square miles and population of 250,000.

Parasites (*păr′ȧ-sīts*), among plants those which obtain food by attacking living plants or animals. The majority of parasitic plants are fungi (which see). Many of them have cultivated a very selective habit, restricting themselves to certain plants or animals or even to certain organs. Some of the highest plants are also parasitic, as, for example, the dodder, whose thread-like body is often seen enwrapping tall herbs like skeins of yellow yarn; and the mistletoe, growing in tufts on the branches of trees. In every case the plant or animal attacked is called the host. Sometimes the attacks are harmless, but often they are very destructive. The results of the most destructive parasites have come to be spoken of as diseases, and among them are some of the common contagious diseases. Among animals representatives of almost any class or order may be parasitic. Many of the parasites are insects; some are parasites of other insects, some of vertebrates. Parasites may serve as hosts to lesser parasites. Some in their earlier stages live within their host, some on the host. The parasite frequently destroys its host. Numbers of insects injurious to vegetation are held in check by parasites that destroy eggs and larvæ; the chalcis flies are parasitic upon grain weevils, the destructive scale insects have for enemies various internal parasites. A common and troublesome parasite is the bot-fly, pest of horses. Lice are thoroughly parasitic. So are many families of worms.

Parcel Post. Under a law passed in 1912 the United States was divided into 8 zones and the postoffice began carrying merchandise not exceeding 72 in. in length and girth combined, nor 50 lbs. in weight, for delivery within first and second zones, and 20 lbs. within other zones. Parcels must be so wrapped that contents may be examined. Domestic rates on 4 ozs. or less, 1c per oz. or fraction, regardless of distance; parcels exceeding 4 oz. at prescribed rates, according to zone. On books up to 8 oz., 1c for each 2 oz.; on those exceeding 8 oz. regular zone rates. Shipments to U. S. dependencies and foreign countries pay special rates. Packages may be sent C. O. D. and by special delivery and may be insured. Explosives, intoxicating liquors, animals, meat, articles objectionable because of odor or otherwise, or dangerous to handle, are excluded. Canada introduced parcel post in 1914.

Pare (*pȧ'rā'*), **Ambroise,** the first practitioner of modern surgery, was born at Laval, France, about the beginning of the 16th century, and received his training at the Hôtel Dieu in Paris. In 1536 he joined the army, going to Italy as surgeon, and in a later campaign improved the treatment of gunshot wounds by tying the broken arteries, instead of burning them with a red-hot iron after amputation, and made many other changes. In 1552 he became surgeon to Henry II, and afterwards to Charles IX and Henry III. His principal writings, *Five Books of Chirurgy,* have been a great aid to modern surgeons. He died at Paris, Dec. 22, 1590. See his *Life* by Paulmier.

Parenchyma (*pȧ-rĕn̄-kĭ-mȧ*), the tissue in plants whose cells have thin walls, their three dimensions being approximately equal. They are the working-cells of a plant, as distinct from the mechanical tissues. Parenchyma is the original tissue of every plant, and by its various modifications new tissues arise. Ordinary pith is a good illustration of dead and empty parenchyma cells.

Parent-Teacher Associations. The National Congress of Mothers, organized in 1897, in Washington, had for its object the formation of Parent-Teacher Associations to effect co-operation between parents and teachers in the education and welfare of the child. Membership in these associations includes the poorest as well as the most noted women in the country. Associations are formed in connection with different school grades, thus bringing together women whose children are of about the same age. Men and women of national reputation are officers and members of the Advisory Council and the movement has the endorsement and backing of the leading educators of the country. Active associations exist in New York, Chicago and other cities throughout the country and there are state branches in thirty states.

The National Congress of Mothers which is made up of Parent-Teacher Associations supplies educational material and programs for use of the Associations. It includes on its Educational Committee the leaders in child study in the United States. This is the strongest child-welfare movement in the world, numbering upwards of 100,000 parents in membership and steadily increasing. The Parents Educational Union and like organizations in England are doing a similar work on a much more limited scale.

The movement has succeeded in enlisting all denominations in its work and has the co-operation of the Religious Education Association, the International Kindergarten Union and the National Education Association. Its founders were Mrs. Theodore W. Birney of Washington and Mrs. Phoebe A. Hearst. MRS. FREDERIC SCHOFF, *ex-President National Congress of Mothers and Parent-Teacher Associations.*

(Helpful articles in THE STUDENT'S on the teaching and training of children will be found listed under Pedagogy.)

Par'is, the capital of France and the second city in Europe, is situated on the Seine, about 110 miles from its mouth. It is the seat of the French senate and chamber of deputies, the executive of the president of the republic and the ministry and the legations of the foreign nations. The local or civic administration is the municipal council of Paris, a body of 80 members. It is the center of a network of rivers, canals and railroads. It is divided into two parts by the river, and surrounded by a range of hills from two to five miles distant. The fortifications consist of a rampart over 22 miles in length, with 57 gates, which it took 20 years to build, and beyond are 16 forts. The houses are built of a light-colored limestone, six or seven stories high, each floor making a distinct dwelling. Some of the finest streets are Rue de Rivoli, Rue de Faubourg, St. Honoré and Rue Royale. The boulevards, broad streets extending in a semicircle on the right side of the Seine, are lined with trees, seats and stalls, while restaurants, shops and places of amusement succeed each other for miles. The city has many beautiful squares, called places, among the finest being the Place de la Concorde, the Place de la Bastille, Place Vendôme, Place de l'Étoile, Place de l'Opera and Place Royale. In Place de la Concorde is the obelisk of Luxor, brought from Egypt, 73 feet high and covered with hieroglyphics. Here also was the site of the guillotine during the Revolution of 1789. On Place Vendôme stands Napoleon's column of victory. There are a number of fine triumphal arches in Paris: the Porte St. Denis, erected by Louis XIV, is adorned with bas-reliefs representing his victories, and the Arc de l'Étoile (Arch of the Star), begun by Napoleon in 1806 and costing $2,000,000, has the names of 384 generals and 96 victories inscribed on its walls. Ten avenues lead from this arch, one of them, the Avenue Bois de Boulogne, bordered by gardens and leading to Bois de Boulogne Park, considered one of the finest streets in the world. Another fine avenue, more like a park than a street, is the Champs Elysées (Elysian Fields). Other noted avenues are Boulevards St. Michel, St. Germain, Haussman and Sebastopol; while other prominent buildings are the Hôtel de Ville, Hôtel des Invalides, Palais de Justice, Palais Royal, Palais Bourbon, Palais de Luxembourg and the Palais de l'Elysée, the latter the presidential residence.

The Seine is crossed by over 30 bridges, which communicate with spacious quays planted with trees, affording fine walks along the banks of the river. Of these bridges the Alexander III bridge, the finest of all, cost over $1,000,000.

The Louvre, the finest modern palace in Paris, is built on the site of an old castle of the 13th century and is connected with the palace of the Tuileries by a great picture-gallery. It is filled with sculptures, paintings and collections of Greek, Roman and Egyptian antiquities. The Tuileries was burned by the Commune during the siege of Paris. The Palais Royal, the palace of the Luxembourg, the Hôtel de Ville, the Palais de Justice and the old prison of the Conciergerie are all noted buildings. The Cathedral of Nôtre Dame, begun in the 12th century, is one of the finest specimens of Gothic architecture in the world. The Sainte Chapelle was built by Saint Louis to contain the crown of thorns and a piece of the true cross, brought by him from the Holy Land. St. Germain des Près, finished in 1163 and probably the most ancient church in Paris, contains the tomb of St. Genevieve, the patron saint of Paris The Madeleine, the Panthéon and l'Oratoire are some of the best known of the modern churches. The Grand Opéra is one of the most sumptuous of continental theaters: other theaters are the Odéon, Théâtre Français and the Théâtre Italien.

The institutions connected with the University of France are in the Latin quarter of the city. There are found the Sorbonne, with its lecture-rooms, class-rooms and large library open to the public; the College of France; and a large number of colleges, lyceums and schools of engineering, roads and bridges, charts, fine arts etc.; and also the observatory and botanical gardens. The National Library has the largest collection of printed books in the world. The art-galleries and historical collections of the Louvre, historical museum, Hôtel Cluny, the palace of fine arts and the museum of artillery are among the richest collections in Europe. (See LIBRARIES.)

The business of Paris is largely in articles of luxury, as jewelry, bronzes, artistic furniture, gloves, watches and perfumery. It is a great financial center, the Bank of France having the privilege of issuing all the bank-notes in France, and the mint being located here. Paris is divided into 20 districts, each of them under a mayor of its own, governed by the préfect of the Seine, appointed by the government, and by a council elected by the people.

Paris is named after the Parisii, a tribe of Gauls whose collection of mud huts stood upon its site when conquered by the Romans. In 53 B. C Lutetia, as it was then called, was an important Roman town; an amphitheater of that period, capable of holding 10,000 people, has been laid bare by excavations. In the 4th century the city was called Paris, and in the 6th century it was chosen by Clovis as the seat of government, though it did not permanently become the capital of France until the 10th century. In the reign of Philip Augustus (1180–1223) Paris, next to Constantinople, was the greatest city in Europe; with its university attracting crowds of students, its churches of Nôtre Dame (partly built) and Sainte Chapelle and the castle of the Louvre, the citadel of Paris. Louis XI, Henry IV and Louis XIV improved the city, organizing its police, drainage and sewerage systems, public schools and charities. Napoleon not only removed the marks of the terrible destruction of the Revolution, but built up the city on a grander scale, with new bridges, streets, squares, arches and public gardens, spending on its restoration more than $2,000,000 in 12 years. Yet as late as 1834 the gutters ran through the middle of the streets; there were scarcely any side pavements; and the city was lighted by oil-lamps suspended on cords across the streets Modern Paris owes its beauty to Napoleon III. Under the direction of Haussmann his plans were carried out, broad, straight streets were built through the labyrinth of dark and narrow ones, boulevards constructed connecting all the public squares, and in place of the old houses in the heart of the town, torn down to make way for his improvements, a new city was built. Water was freely supplied, and trees and gardens and fountains sprang up everywhere, making Paris one of the greenest and shadiest of modern cities. In 1867, when the International Exhibition opened, and especially in 1900, when another exposition was held, Paris was the most splendid city in Europe. The siege of Paris by the Germans in 1870, followed by the terrible destruction made by the Commune, destroyed many of the finest buildings and historical monuments that can never be replaced. Under the republic new streets have been opened; the Champs de Mars (Field of Mars) changed into a beautiful garden, in which rises Eiffel Tower; a system of city railroads planned which connects the railroad stations with the heart of the city; and the deepening of the Seine will make Paris a seaport and do much to make it a center of the world's commerce Beyond the city's fortifications there are many resorts which the visitor to Paris should see, especially St. Cloud and Versailles, together with the Bois de Vincennes and the Bois de Boulogne; while interest will be found in a visit, within the city's environs, to the Cemetery of Père la Chaise. Population 2,888,110 or, including suburbs, 3,000,000. See *Paris in Old and Present Times* by Hamerton; Hare's *Paris*; Baedeker's *Guidebook to Paris;* and Reynolds-Ball's *Paris in its Splendour.*

Paris, a Greek legendary character, sometimes called Alexander, was the second son of Priam and Hecuba, king and queen of Troy. Before his birth his mother dreamed that she was to bear a firebrand which would burn the city. So his father took him to Mount Ida, where he was found after five days by Agelaus, a shepherd, after having been fed by a bear He became reconcile to his father and afterward was made umpire by Juno, Minerva and Venus as to which goddess was entitled to the golden apple of discord. Venus bribed him by offering him the most beautiful woman as a wife and he decided in her favor. He carried away Helen, the wife of Menelaus, and caused the Trojan War. In it he killed Achilles, and was himself wounded by a poisoned arrow from which he died. See Tennyson's *Œnone.*

Paris, Tex., a city, county-seat of Lamar County, having the service of four railroads. The county court-house is a magnificent building, and the government court-house and postoffice are also noteworthy. The leading industries are cottonseed-oil mills, a cotton oil refinery, flour mills, an iron foundry, candy, mattress and broom factories and woodworking establishments. Paris has an exceptionally fine public school system, its high school being affiliated with the University of Texas. It has several churches, all modern improvements and a population of 19,000.

Paris, Count de (Louis Philippe Albert d'Orléans), a descendant of the French Bourbons, son of the Duc d'Orléans, grandson of King Louis Philippe and claimant to the throne of France. He was born at Paris, Aug. 24, 1838; educated in England; and acquired considerable military experience during the Civil War in America as a member of the staff of Gen. George B. McClellan. He married in 1864 his cousin, the daughter of the Duc de Montpensier, by whom he had six children. He was admitted to the National Assembly in 1871, at the close of the Franco-Prussian War; and that body voted the restitution of the property of his family. In 1873 he acknowledged the Comte de Chambord as the representative of the royal house of France, but on the death of that person in 1883 he united in himself the claims of both branches of the Bourbon claimants and was forced to leave France in 1886 by reason of the expulsion act. After this he lived in England in retirement until his son tried in 1890 to enlist in the French army in violation of the law of exile. This being detected, some excitement was caused by the apparent revival of his claims. His printed works are two: one the *History of the Civil War in America* and the other the *Condition of the English Workman.* He died at Stowe House, Buckinghamshire, England, Sept 8, 1894.

Park, Mungo, an African traveler, was born in Scotland, Sept. 20, 1771. He became assistant surgeon on the *Worcester* and on his return offered his services to the African Association and sailed from England, May 22, 1795. After learning the Mandingo language at Pisania he set out, but soon fell into the hands of a Moorish king, who made him prisoner, but from whom he escaped in 1796. He wrote an account of his travels in a work, *Travels in the Interior of Africa.* In 1799 he married at Selkirk, but the life of a country surgeon was too quiet for him, so in 1805 he sailed for the Niger country, in Africa, on behalf of the government. His account of the second voyage was published in 1815, and has been of much value to subsequent explorers. See Joseph Thomson's *Mungo Park.*

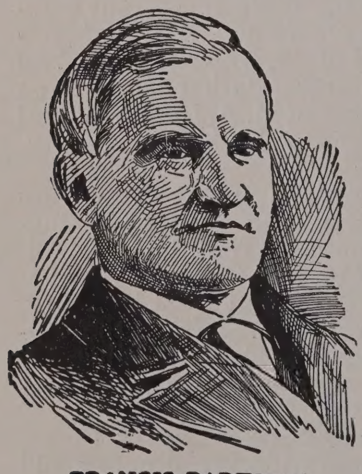
Par'ker, Col. Sir Gilbert, M. P., Anglo-Canadian novelist and since 1900 English member of Parliament, was born in Canada, Nov. 23, 1862, and educated at Trinity University, Toronto, from which he holds the degree of D. C. L. He was trained to journalism in Australia, whither he proceeded in 1886 when in indifferent health, and there first began his literary and powerful dramatic work. This consisted of an adaptation of Goethe's *Faust* for the stage, a drama entitled *The Vendetta* and a book of travel — *Around the Compass in Australia.* Removing to England, he there entered on an active and successful literary career in writing stories and novels of French Canada and the Canadian Northwest and doing for the romantic side of Canadian life what Kipling has done for England. His subsequent work deals with life in Egypt and the Channel Islands. Sir Gilbert is an ardent Imperialist. His novels include *Pierre and his People, Mrs. Falchion, The Trespasser, When Valmond Came to Pontiac, The Seats of the Mighty,* which has also been dramatized, *The Pomp of the Lavilattes, The Battle of the Strong, The Right of Way, The Trail of the Sword, The Translation of a Savage, Donovan Pasha, A Ladder of Swords,* a play, *The Wedding Day,* and a *History of Old Quebec.* In 1895 he married Miss Van Tine, of an old and wealthy New York family.

Parker, Horatio. Composer and professor of music at Yale University; born at Auburndale, Mass., September 15, 1863. After the early lessons of his mother he studied with Emery, Orth and Chadwick in Boston and later with Rheinberger in Munich. His versatility is apparent in the long list of works from his pen ranging from songs and piano pieces to oratorios and symphonies. Among his more important compositions are *Hora Novissima, A Wanderer's Psalm, The Legend of St. Christopher* and an organ concerto. Professor Parker has received the honorary degrees of M. A. from Yale and of Mus. Doc. from Cambridge University, England.

Parker, Theodore, a great American preacher, was born, Aug. 24, 1810, at Lexington, Mass., and graduated from Harvard Divinity School in 1836, and the next year became a Unitarian minister at West Roxbury. He was somewhat separated from the conservative Unitarians, as shown by his *The Transient and Permanent in Christianity* and his *Discourses of Matters pertaining to Religion,* followed by *Sermons of the Times,* all of which attracted widespread notice and comment. He lectured throughout the country and became an ardent antislavery agitator. He died at Florence, Italy, on May 10, 1860.

Parkersburg, W. Va., the capital of Wood County, at the junction of the Ohio and the Little Kanawha River, 12 miles southwest of Marietta, O., and 95 miles below Wheeling. W. Va. It is on the lines of the Baltimore and Ohio, the Baltimore and Ohio Southwestern and the Ohio railroads. The region about is rich in oil and natural gas, and has a considerable trade in petroleum as well as in lumber. Its industries include oil refineries, iron foundries, boiler and machine shops, barrel factories, lumber mills, chemical works, flour mills, veneer works and furniture factories. It has an extensive trade in manufactured goods, farm products and coal. It has many public buildings, with a fine postoffice, courthouse, St. Joseph's hospital, Washington high and public grade schools, churches, banks, etc. Population 22,000.

Parkhurst, Rev. Charles Henry, an American Presbyterian clergyman, was born in 1842, at Framingham, Mass. He attended Amherst College and several German universities. Mr. Parkhurst is very well-known as a forceful and practical preacher. Since 1880 he has been pastor of the Madison Square Presbyterian Church, New York City. He became in 1891 president of the Socirty for the Prevention of Crime; and his attacks upon the corruption which had gained ground in the police department led in 1894, to a senatorial investigation, which resulted in a movement toward reform. Dr. Parkhurst has published a number of religious works, which often have a prominent social and even political side. Among these are *The Pattern in the Mount; Three Gates on a Side; The Question of the Hour; The Fellowship of Suffering; Our Fight with Tammany, What Would the World be Without Religion? The Sunny Side of Christianity;* and *Guarding the Cross with Krupp Guns.*



FRANCIS PARKMAN

Parkman, Francis, an eminent American historian, was born at Boston, Mass., Sept. 16, 1823. He graduated at Harvard in 1844, and after studying law two years made a journey to explore the Rocky Mountains. His life among the Dakota Indians and other tribes was full of hardships, from the effects of which he suffered all the remainder of his life. His first publication was an account of this journey, called *The Oregon Trail.* His historical writings have been chiefly connected with the French power in America, beginning with *The Conspiracy of Pontiac,* (in historical order the latest), published in 1851. After visiting France in 1858 to study French documents on the subject, he wrote *Pioneers of France in the New World; Jesuits in North America; Lasalle and the Discovery of the Great West; The Old Régime in Canada; Count Frontenac and New France under Louis XIV; Montcalm and Wolfe;* and *A Half-Century of Conflict.* This large amount of historical writing, done at great disadvantage from defective eyesight and feeble health, has been carefully and accurately worked out, his first visit to France being followed by several others for purposes of research. His literary style is picturesque and fascinating. He died at Jamaica Plain, near Boston, Nov. 8, 1893.

Par'liament, the name given in England to the national assembly and meaning a gathering for discussion, from the French word *parler* "to talk." It consists of two bodies, called the house of lords and the house of commons. The house of lords is composed of the lords spiritual or the clergy, represented by the archbishops of Canterbury and York and 32 bishops; and of the lords temporal, who represent the noble families of England, Scotland, Ireland and Wales. The titles used are duke, marquis, earl, viscount and baron, and they are commonly called peers. The crown has the right to make new peers in addition to those who inherit their titles. In 1907 there were 616 peers on the roll of the house of lords. The chief officer of the house of lords is the chancellor or keeper of the great seal, who acts as speaker but does not keep order. The house of commons consists of members elected by the people, representing counties, towns and the universities. The larger counties and towns (or boroughs) are divided into districts, each one being entitled to a representative. There are 670 members in the house of commons, 30 from Wales, 72 from Scotland, 103 from Ireland and 465 from England. The chief officer of the house of commons is the speaker, chosen by the members. The members receive no salary, but have certain privileges. Parliament is called or dismissed by the government, but by law there cannot be more than three years between the closing of one parliament and the calling of a new one, and no parliament can hold its sessions longer than seven years. The decisions of Parliament cannot be changed by any court of law. The houses of parliament are in Westminster, a part of London. The acts of Parliament must receive the approval of the reigning sovereign, which is obtained through the ministers or members of the cabinet council. The royal assent has been given to every bill which has passed the two houses since the time of Queen Anne. The name dates to the 13th century, and the conflicts between the people and the throne, which have gradually increased the powers of Parliament, are the chief theme of English history.

Parliamentary Law. It is well that we should know some of the parliamentary rules which govern the conduct of organized meetings, for all of us are frequently members of clubs, classes, assemblies and other organizations. If there is no existing organization, an individual calls a meeting, and presides, announcing that nominations are in order for temporary chairman. Nominations do not require a second. After all nominations are made, motion is made to close nominations, seconded, and carried; ballot is taken and temporary chairman assumes the chair. He announces the next duty is to elect or appoint a committee to draft the constitution and by-laws. A motion is made to choose the committee by one of these methods, seconded, and the chair then calls for remarks. Vote is then taken, and the majority rules. While one motion is in order, discussion of some other topic can not take place. As a rule motions are made, seconded, discussed, and voted upon. The majority rules generally; sometimes, in cases of elections, etc., a plurality may be demanded, having been specified beforehand.

After a motion has been seconded, a member may move to amend the motion. Amendment takes precedence over the motion. Only two amendments may be made before a vote is taken. Amendments are debatable. In voting, any possible amendment to the amendment is voted on first, then the amendment, then the motion.

When motions are in debate, the previous question may be moved, and takes precedence over the motion being debated, and motions to amend, postpone, and so forth, but yields to a motion to lay on the table or adjourn. It may be moved by the one who offers the motion at the time he offers it, if he wishes. If passed, vote is taken on the motion. It is used to prevent debate.

During debate a member may rise and move that the motion be laid on the table. If carried, the motion is shelved. Motion to lay on the table is not debatable, can not be amended, requires a majority vote, and is generally employed when it is desired that the matter be dropped entirely, and no vote taken, for it requires a majority vote to take a motion from the table, and very often this is never sought.

After the chair has repeated a motion, the maker can not withdraw it without so moving, and the will of the assembly determined.

If a motion is before an assembly, and time is desired before a vote is taken, motion may be made to postpone the question. If carried, the matter comes up as unfinished business at the next meeting, unless the postponement carries with it a specified time for reconsidering. Motion may be made to postpone indefinitely. This motion can not be objected to, nor tabled. If carried, the result is generally equivalent to defeating the original motion without actually voting on it, for frequently it is never brought up.

Motion to adjourn requires a majority vote, and is not debatable. It can not be made while any member has the floor, or during voting.

Motions are often made to refer questions to a committee, which motion designates the number and method of choice of the members of the committee (by ballot or appointment by chair,) unless there are standing committees which operate during certain set periods of time. The committee reports its findings, and generally its recommendations; whereupon motion is made, seconded, and vote taken.

The general order of business is: roll call, reading of minutes, reports of committees, unfinished business, new business.

Par'ma, an Italian town, the former capital of the duchy of Parma, lies on the River Parma, 12½ miles from the Po, on the Emilian road. The town is still surrounded by walls and is guarded by a citadel. Of more than 60 churches the most noted are the cathedral, the baptistry, Madonna della Steccata and St. John the Evangelist. Other notable buildings are the ducal palaces, library, university, music-school and museum.

Parnas'sus, a mountain in Phocis, Greece, upon whose highest peak (8,036 feet) occurred the worship of Bacchus. The mountain was the seat of Apollo and the muses, and at its base lay the seat of the oracle of Delphi and the fountain of Castalia.

Pa'ros, one of the largest islands of the Greek Archipelago, in the Cyclades division, is of pyramidal shape, and has an area of about 64 square miles and a population of nearly 7,000, of whom its capital, Parikia, contains 2,300. Its exports are wine, wool and figs, and the quarries of celebrated Parian marble near the top of Mt. St. Elias are still worked.

Par'rish, Maxfield, an American artist, was born at Philadelphia in 1870. As an illustrator, he is known by magazine covers and posters. He designs in elaborately detailed ground or background, flat tints and strong but delicate outline. His illustrations to *Mother Goose in Prose* were signally successful.

Par'rot, a tropical bird, with short, hooked bill, thick fleshy tongue and usually brilliant plumage, the foot distinguished by the first and fourth toes pointing backward and the second and third forward. The family is a large one embracing over five hundred species. It includes macaws, cockatoos, true parrots and parrakeets. Parrots live usually in flocks, either in forests or on grassy plains. Their food is mainly vegetable, consisting of fruits, seeds, buds, leaves and flowers. In South America are found the greatest number of species; in Europe there is none, but one species exists in the United States. There are only a few in Asia and Africa; some very curious ones occur in New Zealand and Australia. In New Zealand is found the kea, a bird able to kill a sheep. Its feet are large and strong. The macaws, found only in South America, are the largest parrots, brilliantly colored and conspicuous objects in the tropical forests in which they dwell. Though the feathers are beautiful, parrots' voices are anything but fine. They are sometimes taught a few words, and are generally kept as pets, in spite of their persistence in screaming and their vicious habit of biting. Cockatoos as a rule are snow-white and wear striking crests. They are found in the Philippines, the Celebes, Australia and the Malay Archipelago. These birds make most satisfactory pets, being of kindly disposition and taking readily to training and speech. Parrakeets are dainty in size and form; unlike most members of the order, they have long, pointed tails. The Caroline parrakeet is found in this country; once it had an extended range here, but now it is seen only in Florida, and rarely there. Its body is bright green, its head and neck yellow. Parrots proper have short, square tails, and are birds of moderate size. They are characterized by Hornaday as "naturally sedate and observant, possessing excellent memories, fond of the companionship of man . . . the broad, fleshy tongue rendering possible the articulation of many vocal sounds." The voice is naturally harsh, but many can be taught to speak. Parrots vary much individually in their capacity for speech. The jako, or gray parrot of Africa is the best talker; the yellow-headed parrot of Mexico stands second in the art.

Par'sis (*pär sēz,*) are the few remaining followers of the Persian religion of Zoroaster. Their name is Persian for *Persians.* When Zoroaster lived or whether he lived at all is a question, but that which remains of the alleged teachings shows that at first the belief centered in a single god, but that the god had two spirits, a reality and a nonreality, which soon led to the worship of two gods, one of good and one of evil. The religion flourished to the time of Alexander the Great, but after his death it declined until A. D. 212, when Ardashir caused the book (*Zend*) to be restored and spread it throughout the land. The priests, of whom there were 40,000, became very powerful, and the religion flourished again until the defeat of the Persians in the battle of Nahavand by Omar in 641 A. D. Thereupon the greater portion became Mohammedans, but many fled, some going to India, where they now live under English rule and are much respected. In 1901 there were 94,190 Parsis in British India; and in Persia there are about 9,000 Parsis or Guebers. They eat nothing cooked by a person of another religion, and no beef or pork; prohibit polygamy; and they do not bury their dead, but expose the bodies upon an iron grating. The symbol of their god is the sun and the worship is by a perpetual fire upon the altars. See Monier Williams's *Modern India.*

Par'sons, Kas., a city in Labette County, on the St. Louis and San Francisco and Missouri, Kansas and Texas railroads, the latter maintaining car and machine shops here. It has an industrial establishment and prominent buildings, notably the High School and the Masonic buildings. It was founded in 1871, and incorporated as a city in 1873. The government is vested in a mayor, elected for two years, and a council. Population 20,000.

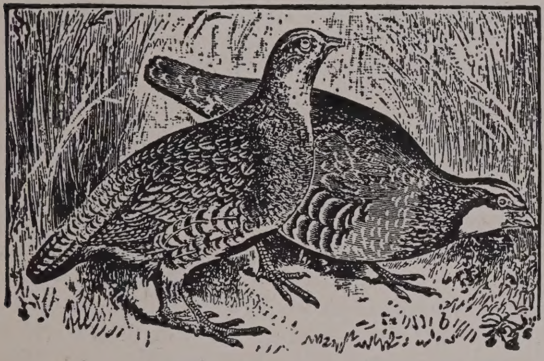
Parthenogenesis (*pär'thē-nō'-jen'-ĕ-sis*) (in plants,) the name applied to the production of a new plant by an egg which has not been fertilized. It is a common phenomenon in certain of the lowest plants (*Thallophytes*), but is very rare in the higher plants. The term is often wrongly used among seedplants to include the formation of embryos within seeds without the presence of pollen. In most of these cases it has been proved that the embryo has not come from an unfertilized egg but has arisen by a budding process from other cells.

Parthenon (*pär'thē-non*) (Greek for maiden's chamber) is the temple of Athené (Pallas) in Athens, as it stands, the most perfect example of Greek architecture. The erection of it was superintended by Pheidias. It is built of Pentelic marble, with eight pillars in breadth and 15 in length, being 228 feet long and 64 feet high. It stood uninjured until 1687, when it was being used as a Turkish magazine and an exploding Venetian bomb reduced it to its present state of ruin. See the Dilettanti Society's *Athenian Architecture.*

Parton, James, an American Author, was born at Canterbury, England, Feb. 9, 1822, coming to New York when five years old. His chief works are lives of Greeley, Franklin, Jefferson, Burr, Jackson and Voltaire. He died at Newburyport, Mass., Oct. 17, 1891.

Par'tridge, a game-bird belonging to the grouse family. The true partridges are Old World birds. Nevertheless the name is loosely applied in the United States to the ruffed grouse, which is called partridge in the North, and to the bob-white called partridge in the South. The common partridge of England and Europe is about a foot long, of a mottled gray color. The red-legged partridge of Europe and Asia is larger and is one of the finest game birds. The California mountain quail or mountain partridge is an interesting bird of our north west. It has a black throat, a noticeable white crescent on each side of the throat and a long drooping plume extending backward from the head. A smaller bird, the valley quail or valley-partridge, the most common June bird of California, is found also in Oregon, Nevada and elsewhere in the west. It dwells high up in the mountains as well as down in the lowlands. Although not gaudy, its coloring is rich, and it wears a black plume that curves forward from its head in most jaunty fashion. In portions of Texas, New Mexico and Arizona may be found Mearns' partridge of Mexico, very striking in appearance, large white spots on its sides, its head adorned with bars of black and white.

See Bob-White.



Partridge

Pasadena (*păs-à-dē'nȧ*), a city and a famed health and winter resort, is situated in Los Angeles County, California, ten miles northeast of Los Angeles and twenty miles from the Pacific Ocean. It is one of the most attractive residential cities near Los Angeles, and of almost park-like beauty. Many of the business men of Los Angeles make their homes in Pasadena, enjoying the scenic drive to and from their work as well as the lovely residential surroundings. The homes have beautiful lawns, and the streets are lined with flowers and shade-trees. Pasadena parks occupy a total of 1,000 acres, exclusive of the twenty-eight playgrounds in natural settings of scenic loveliness. Behind this garden-like city, rise the Sierra Madre mountains, with snow-capped Mt. Baldy crowning the picturesque scenery. The vegetation is sub-tropical, and the climate delightful. Three important railways and a number of excellent highways bring tourists and those seeking health to the city. Of especial interest are Central Park, the beautiful Arroyo Seco, the Carnegie Solar Observatory on Mount Wilson, the old San Gabriel Mission and the Busch Sunken Gardens. The city is the seat of the California Institute of Technology. The educational system includes public, private and parochial elementary schools, Junior high schools, high schools and Junior colleges, with a total annual enrollment of more than 21,000.

On January 1 of each new year, custom has provided that following the Tournament of Roses Parade, the East and West football game takes place in Pasadena's spacious stadium, the famous Rose Bowl. This event has taken place anually for the past forty years.

The industrial life of Pasadena centers in the raising, packing and canning of fruits, chiefly citrus. The beauty of the lemon and orange groves blends with the flowers, lending perpetual beauty and fragrance to the city. Thoroughly in keeping is the annual Tournament of Roses, established more than forty years ago, and celebrated as a festival of great charm and loveliness when the roses are at the perfection of their bloom. Rose-culture consequently is a flourishing occupation of the entire community. Packing houses, drying establishments and canning mills are the chief industries. Other important manufactures include flour mills, cut glass, brick, boots and shoes, furniture and cabinet work, machinery, iron ware, concrete, printing and publishing, and airplanes. Much fresh citrus fruit is shipped. Pasadena is especially noted for the production of high-grade oranges, lemons and limes.

The city of Pasadena was settled in 1874 by a colony of people who came west from Indianapolis, Indiana. They planted the first orchards, and began the fruit-raising that has grown to be such a substantial industry. The city was incorporated in 1886. In 1900 the population was only 9,117; it increased to 30,291 in 1910, and 45,354 in 1920. According to the 1930 census, the population of Pasadena is 76,086.

Pascagoula (*păs-kȧ-gōō'lȧ*), a city and the seat of Jackson County, Mississippi, is situated on the Pascagoula River, about forty miles southwest of Mobile. The city is served by the Louisville and Nashville, and the Pascagoula-Moss Point Northern Railroads. There are thriving paper and canning industries in Pascagoula, and sawmills and shipyards. In 1930 the population was 4,339.

Pascal (*păs-kăl'*), **Blaise,** a distinguished French philosopher and mathematician, was born at Clermont-Ferrand in Auvergne, on June 19, 1623. Before he had attained the age of sixteen, he wrote a treatise on conic sections which was known as Pascal's theorem and even to-day still forms the basis of the modern treatment of the subject. At the age of eighteen he invented a calculating machine. In 1648 he conducted the famous Puy de Dome experiments on atmospheric pressure. Just prior to these experiments he had published his *Nouvelles Experiences sur le Vide.* He continued to pursue his scientific investigations during later life and contributed much to the theory of the equilibrium of fluids, the mathematical theory of probability, and the properties of the cycloid.

Pascal retired to the Jansenist convent at Port-Royal in 1654. There he devoted himself to writing in defense of Jansenism and attacking the moral theology of the Jesuits. His most famous works upon these subjects were his eighteen *Lettres Provinciales* (1656), and *Pensées sur la Religion* (1870), a posthumous work. M. Pascal died at Paris on August 19, 1662.

Passaic (*pă-sā'ĭk*), a city in Passaic County, New Jersey, is situated on the Passaic River at the head of the tidewater, twelve miles from New York City, and nine miles from Newark, New Jersey. The city is primarily industrial, but has a beautiful residential section entirely separated, on the "Hill" with a number of parks, shaded streets and beautiful residences. Among the more prominent buildings are the City Hall, the Reid Memorial Library, the People's Bank Building, the General Hospital and the General Public Library. Of great historical interest is a house in Passaic which was used by Washington as headquarters during his retreat to Morristown. The city is served by three railways, and has excellent bus and electric transportation facilities to the great metropolitan market and outlying districts. Water power from the river has also aided the development of industry in Passaic. Manufactures are varied and numerous. The principal industries include cotton and woolen textiles, rubber goods, metal ware, artificial leather, chemicals and dyes, silks, clothing, machinery, mine dump cars, brass forgings, insulated wire and cables, paper and paper boxes, lumber, structural steel and iron, cigars, disinfectants, oils and greases, windshield and bullet-proof glass, radios and batteries. Passaic was first settled about 1680, and at that time given the name Acquackanonk, which the settlement retained until the middle of the nineteenth century. In 1869 it was incorporated as the village of Passaic, and in 1873 as a city. The population in 1930 was 62,959, of which sixty-one per cent were native whites, thirty-seven per cent foreign-born, and two per cent Negro.

Passaic River, a river of northern New Jersey, rises near Morristown, and flows in a northeasterly direction to form the boundary between Union and Essex counties, after which it turns east and south to empty into Newark Bay. So winding and tortuous is its course, that although its mouth is actually only fifteen miles east of its source, it flows for 100 miles to reach it. The river is bordered by beautiful scenery. At Paterson, New Jersey, it has a descent of seventy feet, known as Passaic Falls. For fifty feet of this descent it falls sharply in a single perpendicular cataract of unusual beauty.

Passamaquoddy (*păs-ȧ-mȧ-kwŏd'ĭ*) **Bay,** an inlet which opens from the Bay of Fundy on the North American coast between the State of Maine and the Province of New Brunswick at the mouth of the St. Croix River. It is about fifteen miles long and ten miles wide, and hemmed in by islands that provide an excellent harbor.

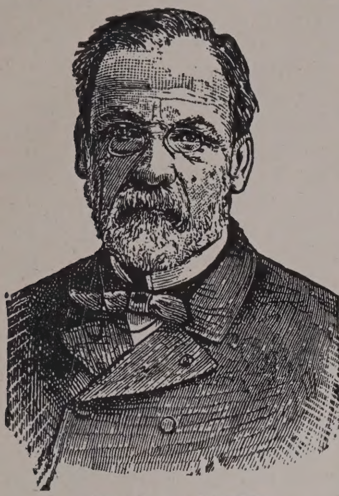
Passion Flower, a species of plant almost exclusively found in the warmer parts of America, has a flower, shading from purple into light heliotrope, of five parts, with narrow lines of white from the edge of the petals meeting at the center. It received its name from the early Spanish settlers, who saw in it the crown of thorns and the five marks of the wounds of the Lord. It is a shrubby, climbing plant with lobed leaves, and some species are cultivated for the fruit, particularly, the sweet calabash of the West Indies, the root of which is poisonous and acts like morphine. The roots, leaves and flowers of some species are used as medicine.

Passover (*păs'ō-vẽr*), an annual feast of the Jews, an account of whose origin is given in *Exodus xii,* is the feast of unleavened bread. The feast was instituted to commemorate the sparing of the Hebrews in Egypt when God, smiting the first-born of the Egyptians *passed over* the homes of the Israelites which had been marked with the blood of the lamb. With the settlement of the Jews in Canaan, the feast and sacrifice became a fixture of the harvest time in the spring, when, after the offering of the first sheaf, the people enjoyed their corn without waiting to have their bread leavened.

The Passover is celebrated on the fourteenth day of the month of Nisan. It has been extended, however, to include eight, rather than seven days, following, during which time only unleavened bread may be partaken of. The feast is accompanied by many rites spoken of in *Chronicles, Ezra, Psalms cxii* and *cxvii; I. Cor. v: 7,* and *John xix: 36.*

Passport is a paper given by a government to an individual authorizing him to leave the country or allowing him to travel through or reside in it, affording the traveller protection. The rule has become somewhat relaxed of late, but Russia and Turkey still insist on them, while Germany requires a passport from a foreigner who wishes to reside in one place for any period of time. In England and the United States no passports are required, but may be obtained as a precautionary measure.

Pasteur (*pas-tûr'*), **Louis,** a distinguished French chemist and biologist, was born at Dole in the Department of Jura, on December 27, 1822. He was graduated from the *École Normale* in 1847, and after holding several academic positions at Strassburg, Lille, and Paris, became professor of chemistry at the Sorbonne in 1867. Up to this time the major part of his work had been accomplished in the field of chemistry, but he soon became intensely interested in microscopical work, particularly along the lines of bacteriology and biology. Pasteur made many discoveries which were of especial benefit to mankind. About 1857 he showed by experiment that fermentation was due to the growth of micro-organisms. In 1859 he engaged against Pouchet in the controversy on the spontaneous generation of life, and by public experiments showed the falsity of Pouchet's position, and proved that spontaneous generation does not occur. In 1865 he turned his attention to the diseases of the silk worm, and in two years was able to arrest the ravages of a disease among them. His discoveries resulted in saving millions of dollars annually to the silk industry. His further work helped in establishing the germ-theory of disease (which see). He studied profoundly the methods of using attenuated virus for vaccination against splenic fever, hydrophobia and other diseases. In 1888 Pasteur Institute was formally opened at Paris for the cure or prevention of hydrophobia. He received many honors both at home and from learned societies all over the world. He died on Sept. 28, 1895. See *Louis Pasteur;* translated by Lady Hamilton.



LOUIS PASTEUR

Pas'teur Institute. This is an institution partly supported and controlled by the French government, which as its chief aim prosecutes researches in cancer, tuberculosis, appendicitis and other prevalent maladies. Its name is taken from Louis Pasteur, who carried on his later researches there. Pasteur indicated the possibility of a science of stereo-chemistry; and was the first to show that the fermentations of milk, butter etc. are due to living micro-organisms. He showed the possibility of vaccination against disease and of sterilizing substances like milk which may convey it. Pasteur Institute became short of funds to continue its valuable researches; but early in 1907 it was the recipient of a legacy of 30,000,000 francs [nearly $6,000,000] under the will of M. Osiois, one of the executors of which was M. Emile Loubet, former president of the French republic.

Pat'ago' nia, as the most southern country of South America was once called, extends south from the Argentine republic 1,000 miles to the Straits of Magellan, which separate it from Tierra del Fuego. The Andes divide the country into two parts, the eastern area of which now belongs to the Argentine republic and the western to Chile. To-day Patagonia is but a geographical term. The western portion is rugged and mountainous, with islands and cliffs along the Pacific coast, which give it a wild outline. The strip of shore along the Pacific from the Andes is so narrow that there are no rivers longer than 13 miles. The temperature varies from 50° to 33°, summer and winter, and is very damp. Coal is mined at Punta Arenas, where Chile has a colony and penal settlement. Eastern Patagonia is not so desolate, but has high plains in some places covered by grass, forests, and shrubs, yet along the Atlantic coast everything is wild. The rivers here are the Negro, Chubut, Deseado, Chico, Santa Cruz and Gallegos, all rising in the Andes Some horses and cattle are raised, and wild fowl and animals are found in some regions. The inhabitants are Indians, almost a race by themselves, who are tall and straight, hardy, strong and muscularly developed. Some Europeans are found at the settlements at Patagones, on the Chubut and the Santa Cruz Magellan sailed along the entire coast in 1520, and the great plain was explored by De Isla in 1535. See works on Patagonia by Falkner, Snow, Pritchard and Musters.

Pataps'co, a river of Maryland, flowing into Chesapeake Bay, 14 miles below Baltimore. It is 80 miles long, and admits large vessels as far as Baltimore.

Pat'ent, the privilege granted by a government to an inventor, of the exclusive right to his invention for a term of years. The royal grant in England was made by letters-patent or open letters, called so because they were not sealed. The system of giving patents is common in Europe and the United States, though Switzerland and Holland have no patent laws and Prussia does not favor them. The United States Patent-Office is a branch of the Department of the Interior, and has its records, models and drawings at Washington. The first American law of patents was passed in 1790; the present law in 1870. Any invention, both new and useful, can receive a patent. It is necessary only that it should be new in the United States, its previous use in foreign countries not preventing a patent. Any person who is the first inventor of anything that admits of a patent can obtain one, whether a resident of the country or a foreigner. The patents are given for seventeen years and cannot be renewed. About 30,000 patents are applied for yearly in America.

PATENTS AND THE CONTROL OF PRICES

A decision by the U. S. Supreme Court in 1913 declared it unlawful for a manufacturer to fix the retail price of his product by refusing to sell to retailers who fail to adhere to this price. The case was one in which a manufacturer of a patented article claimed that his patent gave him the absolute control of the sale of the article, including the price.

Pat'erson, N. J., a city 15 miles from New York city, is situated on Passaic River. The river curves around three sides of the city, and has a fall of 50 feet, which gives the fine water-power used in many manufactures. Its principal manufactures are silk goods and locomotives, paper mills. factories of carpets, shawls, and machinery. There are seven hundred silk factories, making ribbons, handkerchiefs, veils, scarfs, fringes, dress-silks and sewing silk, giving the city the name of the Lyons of America. Population 145,000.

Paterson, William, founder of the Bank of England, was born in Dumfriesshire, Scotland, in April, 1658. He made a fortune by trade in London, and planned the Bank of England, being one of its first directors. He was active in accomplishing the union of England and Scotland. He died on Jan. 22, 1719. See *Life* by Bannister.

Pat'more, Coventry Kearsey Deighton, an English poet, was born in Essex, July 23, 1823, and died in Hampshire, Nov. 26, 1896. His first poems were published in 1844. His best-known work is *The Angel in the House* — a poem in four parts — "The Betrothal," "The Espousals," "Faithful for Ever" and "The Victories of Love." He also edited *The Children's Garland* and *The Autobiography of Barry Cornwall.*

Pat'mos, a small rocky island in the Ægean Sea, now called Patino. It is known as the place of exile of John the apostle, and where, tradition says, he saw the visions recorded in *Apocalypse* or *Revelation.* The monastery of John the Divine, built in 1088, stands on a mountain in the island. The island belongs to Turkey, and is inhabited by about 4,000 Greeks, who live mostly by fishing for sponges.

Pat'na, the fifteenth city of British India, is situated in Bengal on the Ganges. It stretches nine miles along the river, but has narrow streets and poor houses. The government opium factories, Patna College, Mosque of Sher Shah, a Roman Catholic church and a Mohammedan college are the principal buildings. Its situation at the junction of three great rivers, the Ganges, Gandak and Son, gives it a large trade. It exports oil seeds, cocoanuts, salt, spices, cotton, and tobacco. Patna was founded probably about 600 B. C. In 1763 it was the scene of a massacre of British prisoners and of a mutiny in 1857. Population 134,785.

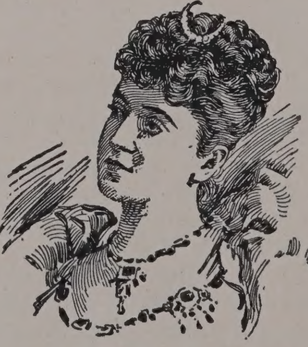
Pa'ton John Gibson, a Scottish missionary whose field of work, for many years, was in the South Pacific Ocean, was born in Dumfriesshire, May 24, 1824. He labored first as a city missionary at Glasgow, and in 1858 went to the New Hebrides, working first among the cannibal natives of Tanna. After four years the opposition of the natives forced him to leave. His great work was done on Aniwa, where he lived twenty years and saw the whole population become Christians. The story of his missionary life, edited by his brother, and published in a Chicago edition in 1892, is one of the most thrilling in missionary literature. He died on Jan. 28, 1907.

Paton, Sir Noel, a British painter, was born at Dunfermline, Scotland, Dec. 13, 1821. His pictures of *Christ Bearing the Cross* and *The Reconciliation of Oberon and Titania* together gained a prize of $1,500. Scenes from fairyland and legend and religious allegory made his work familiar and have been often engraved. Among his works are *Home from the Crimea, Luther at Erfurt, The Fairy Raid, Gethsemane, Christ and Mary at the Sepulchre, The Man of Sorrows* and *Thy Will be Done.* He is known also by his illustrations of the *Lays of the Scottish Cavaliers* and *The Ancient Mariner.* He also wrote two volumes of poems. He died in 1902.

Pa'triarch, Greek, the head of the Greek church. The name patriarch was given to the bishops of some of the larger divisions of sees or bishoprics of the Christian church, and at the time of the council of Nice (A. D. 325) there were three patriarchs: Those of Antioch, Alexandria and Rome. When the seat of empire was changed to Constantinople, its bishop was made a patriarch, and was superior to those of Antioch and Alexandria and second only to the prelate at Rome. The Roman or western and the Greek or eastern church arose from a division in the universal Christian church, resulting from the contests between the patriarchs of Rome and Constantinople.

Pat'rick, Saint, the apostle and patron saint of Ireland, was a distinguished missionary of the 5th century. He is thought to have been born about 392. When a boy he was taken by pirates and sold to an Irish chief, who lived near the town of Broughshane, in County Antrim. He escaped after six years and went to France, becoming a monk. In 432 he went as a missionary to Ireland, landing at Wicklow. He is said to have founded 365 churches, baptized 12,000 people and consecrated 450 bishops. The date of his death is in dispute, the year 470, the latest period given, making him about 100 years old. The only certain writings of his are his *Confessions* and a letter written to a man named Coroticus. See *Tripartite Life of St. Patrick* by Stokes and Lives by Todd, Healy, Bury and Lusack.

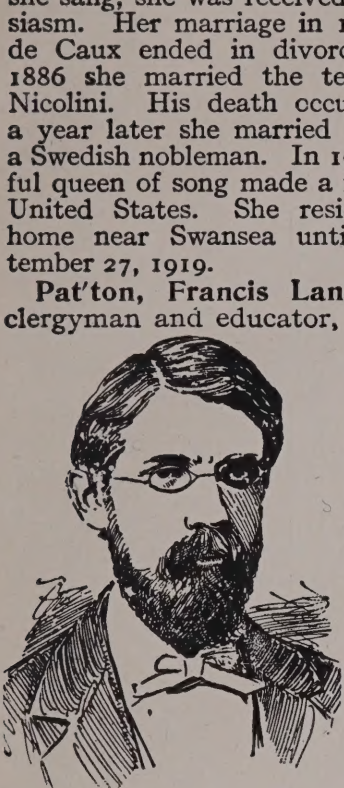
Patti, Adelina (*păt'tē, ăd-ē-lī'nȧ*), a famous opera singer of Italian family, was born at Madrid, Spain, on Feb. 19, 1843. When seven years old, she sang *Casta Diva* in New York, where her family were then living, and made her first appearance in opera in that city in 1859. Her first appearance in London in 1861 was as successful as were



ADELINA PATTI

those in the United States, and there and at Paris and St. Petersburg, and wherever she sang, she was received with great enthusiasm. Her marriage in 1868 to the Marquis de Caux ended in divorce in 1885 and in 1886 she married the tenor singer, Ernest Nicolini. His death occurred in 1898, and a year later she married Baron Cederström, a Swedish nobleman. In 1903–04 this successful queen of song made a farewell tour of the United States. She resided in her Welsh home near Swansea until her death, September 27, 1919.

Pat'ton, Francis Landey, an American clergyman and educator, was born in Warwick Parish, Bermuda, Jan. 22, 1843, and educated at Knox College, Toronto. He graduated at Princeton Theological Seminary in 1865. He received the degree of D.D. from Yale in 1888 and that of LL.D. from Harvard in 1889. He was ordained to the Presbyterian ministry on June 1, 1865, and was pastor in New York City, Nyack and Brooklyn in succession. He became a professor in what now is McCormick Theological Seminary in 1872, where he remained nine years. In 1881 he was elected to a chair in Princeton Theological Seminary and in 1888 to the presidency of the University of Princeton. In 1902 he resigned this office and became president of Princeton Theological Seminary. His published work embraces *Inspiration of the Scriptures* and *Summary of Christian Doctrine*.



FRANCIS PATTON, LL.D.

Paul was the name of five Popes, of whom Paul I and Paul II were unimportant

Paul III (Alexander Farnése) was born in Tuscany in 1468, and elected pope in 1534. Though ambitious to advance his family, making cardinals of two grandsons while they were boys, he was a wise ruler and surrounded himself with good cardinals. His bull or decree of excommunication against Henry VIII of England, issued in 1538, and the one forming the Order of the Jesuits are the most important edicts of his reign. He supported Charles V in his struggles against the Protestant League in Germany. He died suddenly, Nov. 10, 1549. See *Lives of the Popes* by Ranke.

Paul IV (Giovanni (*jō-vän'nē*) Pietro (*pē-ä'trō*) Caraffa) was born at Naples in 1476. He became pope in 1555. He was strict in the punishment of heresy, establishing a censorship to examine books, and was the first to issue a list of prohibited books. He was thoughtful of the poor and just in his government, even banishing his own nephews from Rome on account of their evil conduct. He became involved in quarrels with Emperor Ferdinand, Philip II of Spain and Cosmo, grandduke of Tuscany. His strength giving way, he died on Aug. 18, 1559. See *Lives of the Popes* by Ranke.

Paul V (Camil'lo Borghése) was born at Rome in 1552. He was nuncio or representative of the Roman church at the Spanish court and a cardinal under Clement VIII. In 1605 he became pope. His rule was vigorous, made memorable by his long conflict with Venice on the claim that the clergy should not be liable to trial by the common courts. The dispute was settled in 1607 by the help of Henry IV of France. Paul improved Rome by new public works, the preservation of antiquities and the establishment and renewal of museums, libraries and charitable institutions. He died on Jan. 28, 1621. See *Paul the Pope and Paul the Friar* by Trollope.

Paul, Herbert, English historian and man of letters, member (since 1906) of the British Parliament for Northampton, was born in 1853. Early in his literary career he set himself to write a *History of Modern England*, beginning with the downfall of Sir Robert Peel in 1846 — a work which was completed in 1906 and established his reputation as an eminent writer of the day. Of this work a noted critic has said that "whatever else this book does or fails to do, it establishes Mr. Paul". Mr. Paul then wrote a *Life of Froude* the historian.

Paul, Saint (originally Saul), the great apostle of the Gentiles, was born about 3 A. D., in Tarsus according to some, but according to St. Jerome, at Giscala in Cilicia, and taken to Tarsus in his infancy. He was a Jew of the tribe of Benjamin, and received the name Saul, changed afterwards to Paul. He in some way also was a Roman citizen. He studied at Jerusalem in the famous school of Gamaliel, and makes his first appearance in history as a persecutor of the new sect of Christians. After the persecution at Jerusalem he set out for Damascus on the same errand. His conversion from a persecuting Pharisee to an apostle of the new religion, according to the account given in *Acts*, was effected by a blinding vision which outshone the Syrian sun and, he affirms, was a vision of the Jesus whom he persecuted. Cured of his temporary blindness, he spent three years in retirement in Arabia, and then at Damascus began his wonderful life of labor and suffering. He and Barnabas were the first foreign missionaries of the Christian church, sailing to Cyprus, to Perga and to Lystra, where Paul was stoned and left for dead. He sided with the Gentile converts in their struggle to free themselves from the burdens of the Jewish ceremonies, and thus won the first battle of religious liberty in the Christian church. On his second missionary journey he preached from Areopagus (Mars' Hill) at Athens, to the seekers of "an unknown God," and founded the churches of Philippi, Corinth and Thessalonica. During his third missionary journey through Galatia, Phrygia, Macedonia and the Grecian Islands he wrote his most important group of epistles. On his fifth visit to Jerusalem he was mobbed by the Jews, who charged him with taking a Gentile into the temple, but, claiming protection as a Roman citizen, he was sent to Felix, the Roman governor, at Cæsarea, who kept him two years in prison. Tried again by Festus, he appealed to Cæsar and was sent bound to Rome, suffering shipwreck on the journey. Two years were spent in prison with a guard of soldiers, but he carried on his work of preaching, making converts among his guards and even in Cæsar's household. He seems to have been acquitted at Rome, and there are traces of probable visits to Colossæ, Crete and Nicopolis, his trial and imprisonment at Ephesus and his second journey to Rome. His death under Nero, probably by beheading, as he was a Roman citizen, is taught by Christian tradition; but nothing definite is known of this. Thirteen epistles were written by him and are found in the New Testament, some of them being letters to churches, some to friends, in which are found those truths which make Paul the chief founder of Christian theology. "He has earned the admiration of all Christian ages, because he was great enough to overcome the prejudices of his nation and sect and to be cursed in his own age as a renegade Jew." See *Life and Epistles of St. Paul* by Conybeare and Howson and *Life of Paul* by Dean Farrar.

Pauncefote (*pa̤ns'fo͝ot*), **Julian,** Lord, an English diplomat, was born at Munich, Bavaria, Sept. 13, 1828. He helped negotiate the famous Hay-Pauncefote treaty. (See Hay). He became a barrister of the Inner Temple in 1852; secretary of state for the colonies in 1866; chief-justice of the Leeward Islands in 1874; under-secretary of state for foreign affairs, 1882; delegate for drawing up an act relative to the navigation of Suez Canal in 1885; and minister plenipotentiary to the United States in 1889. He was a member of the international peace-conference at The Hague in 1899, and was afterward raised to the peerage His office in Washington, on account of his distinguished services, was raised from that of a minister to that of an ambassador in 1893. He was created a baron in 1899. He died on May 24, 1902.

Pausanias (*pa̤-sā'nĭ-ŭs*), a Spartan general and nephew of Leonidas. He was in command of the Greeks in the battle of Platæa, 479 B. C., in which the Persians were defeated. He compelled the Thebans to give up the chiefs of the Persian party for punishment, and captured Cyprus and Byzantium. His ambition now made him become a traitor to his country, and he entered into secret negotiations with Xerxes, hoping to rule Greece under him. He was recalled to Sparta and tried, but acquitted because of his former services to the state. A second time he renewed his intrigues, a second time was called to account by the Spartans, and a second time escaped punishment His third effort to stir up the helots to rebellion was betrayed by one of them, and Pausanias took refuge in a temple. The people blocked the gate of the temple with heaps of stones, leaving him to die of hunger, his mother placing the first stone

Pave'ment, a covering of stone, brick, wood, cement or asphalt, placed on a street or road to give a hard and easier surface for travel (See Asphalt, Brick Cement, Stone and Wood.) It is to be distinguished from the gravel and stone coating put on country roads. Pavements are mostly used in cities where the travel is large The first thing necessary in a pavement is a good foundation. The work on the foundation depends largely upon the character of the soil and whether it is well-drained or not. The best foundation is a layer of concrete, varying from six to 12 inches thick according to the loads to be sustained. Of the materials used for pavement, wood in most parts of the United States is the cheapest, but it is not durable, as it rots, even when creosoted and coated with tar. Stone formerly was used in the form of small round boulders, called cobble-stones, but this made so rough a pavement that it is seldom used now. Small rectangular blocks of granite or traprock are often used. About 1880 brick pavements were introduced in the smaller cities of Illinois and Ohio, and brick is now used very extensively in different parts of the country. When the special pavement-bricks of good quality are used and put on a good concrete foundation, they make one of the most satisfactory pavements for ordinary traffic, being both fairly durable and easy to travel on. Asphalt is a bituminous rock found in Trinidad, California and other places. When heated and mixed with sand it is used to coat a foundation on a street, and hardens into a smooth, elastic and durable pavement for residence streets. It is used extensively in many cities in the United States and in Berlin and Paris. Asphalt and brick have the advantage of medium cost and of being easily cleaned. Stone is the most durable, but the most costly.

Pavia (*pȧ-vē'ä*), a city of northern Italy, on Ticino River, 21 miles south of Milan. It was called the city of a hundred towers from its numerous square towers used as prisons, two of which, about 190 feet in height, are still standing. Its oldest church, that of St. Michael, mentioned as early as 661, is the place where the early kings of Italy were crowned; restored in 1863–76, it is now called the royal basilica. The cathedral, begun in 1488 but never finished, contains the tomb of Boëtius, and in a chapel connected with it are the ashes of St. Augustine. Near the city is the monastery of Certosa, which was built by the first duke of Milan, its church being one of the most beautiful of that era. The university, which dates from 1300 and is thought to have been founded by Charlemagne, was famous in the middle ages. It has 1,550 students, 53 instructors and a library of 200,000 volumes. Pavia was founded by the Gauls, sacked by Attila in 453 and by Odoacer in 476. Under the Lombards, as their capital, it became the chief city of Italy. The city was taken by the French in 1527, in 1796 by Napoleon and belonged to Austria after the peace of 1814. Since 1859 it has been a part of the kingdom of Italy. Population 39,319.

Pawnees (*pa'nēz'*), a tribe of American Indians, who lived on the Platte and its branches in Nebraska. They were divided into four bands, and were always fighting the Sioux, but have been friendly to white settlers. In 1833 and 1857 they gave parts of their lands to the United States, which, however, did not protect them from the Sioux, by whom they were slaughtered, until the remnant of the tribe removed to Indian Territory in 1876. See *Pawnee Hero Stories and Folk-Tales* by Grinnell.

Paw-Paw, called also pa-paw and custard-apple, is a small tree or shrub found in the central and southern parts of the United States. The fruit looks somewhat like a ripe cucumber or banana, with a yellow skin, turning brown as it becomes ripe. The flesh is soft, about the color of custard, very sweet and with large, flat, black seeds, larger than those of a watermelon. It is not often found in markets. A variety which grows in South America has a larger fruit, which is cooked with sugar and lemon before eating. Its leaves are used instead of soap, and its juice preserves meat.

Pawtuck'et, R. I., a city in Providence County, is on Pawtucket River, four miles north of Providence. The river has a fall of 50 feet, which makes the city one of manufactures. It was the site in 1790 of the first cotton-factory in the United States (the original building still stands) and for 40 years was the most important manufacturing town in the country. It has cotton, woolen, haircloth and thread factories, calico-printing works, bleaching and dyeing establishments, hosiery and silk mills, boot and shoe factories and jewelry works. Pawtucket was settled about 1655, formed a part of Bristol County, Conn., until 1861, and became a city in 1886. Population 75,000.

Pax'ton, Sir Joseph, an English architect, was born in Bedfordshire, Aug. 3, 1801. He began life as a gardener in the service of the duke of Devonshire. His care of the duke's great glass conservatories at Chatsworth suggested the use of glass and iron for the Crystal Palace for the great exhibition of 1851. It was the first time these materials had been used for so large a building, and the effect delighted all who saw it. Paxton was knighted for his successful design. He sat in Parliament nine years, and died at Sydenham, near London, June 8, 1865.

Payne, John Howard, an American dramatist, was born at New York, June 9, 1792. His first appearance as an actor was in that city in 1809. He was a successful actor for 30 years and wrote several plays, of which the best known are *Brutus, Charles II* and *Clari*. The song, *Home, Sweet Home,* for which he is remembered, is in *Clari*, which was produced as an opera. The author had no home for the last 40 years of his life, and died in a foreign land, having been appointed American consul at Tunis, where he died on April 10, 1852. His remains were brought to America, and buried at Washington in 1883. See *Life and Poems*, edited by Harrison, and *J. H. Payne* by Brainard.

Pea, an annual vine (*Pisum sativum*) of the order *Leguminosæ*, commonly grown in gardens all over the world and extensively sown in fields as fodder for cattle. It is a climbing vine with pinnate leaves. Its original home is western Asia and eastern Europe. Pea-seeds have been found in Egyptian tombs. About 200 varieties of garden-peas are annually offered by American seedsmen. Wrinkle-seeded peas are generally considered superior in flavor to smooth-seeded peas. Peas thrive best in fairly rich, well-drained, loamy soils. The plants are hardy, withstanding light frosts without injury, though not succeeding well in dry, hot weather. Their wealth of nitrogenous elements makes them valuable fertilizers of soils. Canada and our northern states are the chief sources of the dried peas, and furnish practically all pea-seed. Peas are highly prized as food. Immense quantities are canned green. Several plants of the *Leguminosæ*, as the sweet pea (*q. v.*) are called peas, though not peas. They have more than 20 insect-enemies, the green pea-louse doing prodigious damage.

Pea'body, Andrew Preston, an American (Unitarian) clergyman, was born at Beverly, Mass., March 9, 1811. He graduated at Harvard College in 1826, studied theology, and for seventeen years was pastor of a church at Portsmouth, N. H. He was then appointed preacher and professor of Christian morals in Harvard University. For nine years he was editor of the *North American Review*, a frequent contributor to periodicals and a well-known lecturer. He published *Christian Doctrine, Christian Consolations, Manual of Moral Philosophy, Chris-*

tianity and Science and *Christian Belief and Life.* He died on March 10, 1893.

Peabody, Elizabeth Palmer, an American educator, was born at Billerica, Mass., May 16, 1804. She was a sister of Mrs. Nathaniel Hawthorne and Mrs. Horace Mann. She taught in Bronson Alcott's celebrated school and was one of the first to introduce the methods of Froebel into American schools and to use object-lessons in teaching. She was the first to establish a kindergarten in America. She published many works of an educational character, especially upon her favorite theme. Among her best-known works are *The Kindergarten in Italy*, *Letters to Kindergartners* and *Guide to the Kindergarten* etc. She died at Jamaica Plain, Mass., Jan. 3, 1894.

Peabody, George, an American merchant and banker, was born at South Danvers, Mass., Feb. 18, 1795. When 11 he began his business life in a grocery, was next a clerk in Thetford, Vt., and afterwards partner of a dry-goods house in Georgetown, D. C. This business was removed to Baltimore in 1815, and had branches at Philadelphia and New York in 1822. In 1837 he settled in London, starting a banking house and making a large fortune, partly by investing heavily in government bonds during the Civil War. In 1851 he supplied the money needed to fit up the American department of the Great Exhibition at London. His fame rests, not on his wealth, but on his benevolence, as during his lifetime he gave away five and a half million dollars. Among these gifts were $10,000 to the Grinnell expedition to the north pole under Dr. Kane; $200,000 to found Peabody Institute at South Danvers; $50,000 to an institution at North Danvers; $1,000,000 to Peabody Institute at Baltimore; $25,000 each to Phillips Academy, Andover, and Kenyon College, at Gambier, O.; $150,000 each to Harvard and Yale; and $3,500,000 as a fund for educational purposes in the south. He also spent $2,500,000 in building model homes for the poor of London, of which in 1889 there were eighteen groups in different parts of the city, accommodating 20,000 people, while the rents and interest brought in $150,000 net profit. He was offered the title of baron by Queen Victoria, but declined, asking only for "a letter from the queen, which I may carry to America and deposit as a memorial of one of her most faithful sons." The letter was given with the queen's portrait, and both are deposited in Peabody Institute, South Danvers (now called Peabody in honor of its illustrious citizen). He died at London, Nov. 4, 1869, his body being sent to America in an English warship. There are statues of Peabody at London and Baltimore. See *Life* by Hanaford, and *Beneficent and Useful Lives* by Cochrane.

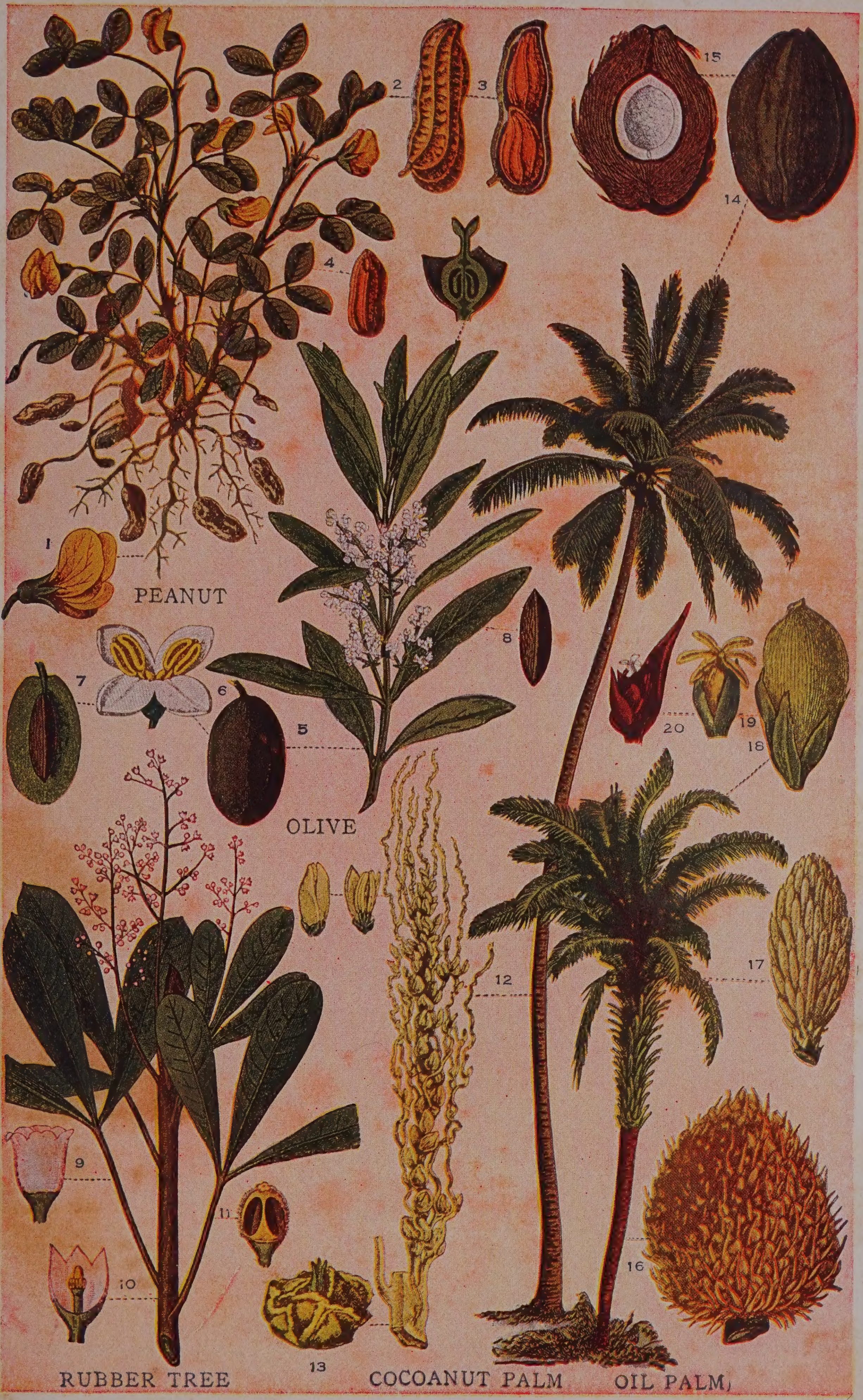
Peabody, Mass., a city in Essex County, on the Boston and Maine Railroad, two miles from Salem. It includes several villages, and is a manufacturing center of considerable importance. It has a good system of public schools. Peabody Institute with a library of about 40,000 volumes is here, as is Eben Dale Sutton Reference Library. Essex County Agricultural Society and Peabody Historical Society have their permanent quarters in Peabody. The latter in 1902 presented Peabody Institute with a small safe containing pictures of the town and articles written by the leading citizens and municipal officials, to be opened on or after June 6th, 2002. Peabody was separated under the name of South Danvers in 1855. The present name was adopted in 1868 in honor of George Peabody who was born, and for some years lived, there. The government is administered by town-meeting. Population, 21,000.

Peace River, a great river in Alberta, is formed by the junction of the Findlay and Parsnip in the center of northern British Columbia 1,000 miles to the west. It flows into Lake Athabasca. Peace River practically passes through the center of a vast district, and in the development of this will play an important part, since navigation is practically without a dangerous rapid or obstacle of any kind throughout its whole course, with the exception of that at Vermillion Chutes (five miles above where the Little Red River joins the Peace). It runs through a country of vast natural resources, as timber, asphalt, copper, salt and fish. The agricultural possibilities are unsurpassed in the northwest. The Hudson Bay Company has a large and excellently equipped flour-mill at Fort Vermillion, 670 miles north of the United States boundary and where there is a settlement of 500 people. Considerable wheat, oats and barley were grown there in 1906. Wheat has been successfully raised for over twenty years. Peace River Valley is a tract 75 miles in width on each side of the river and seven or eight hundred miles long. The soil is claimed to be as good as that on the Saskatchewan.

Peace Soci'eties, organizations for the promotion of peace. They have a large and influential membership and include the American Peace Society, the American Society for the Judicial Settlement of International Disputes, the Carnegie Endowment for International Peace, with headquarters in Washington; the Church Peace Union, the American Association for International Arbitration, New York City; the Intercollegiate Peace Association, Cleveland and the World Peace Foundation and American School Peace League of Boston.

Similar organizations exist in Europe, and it is partly through their influence that the Hague (*q. v.*) conferences have accomplished important results.

The American School Peace League with branches in the various states includes in its membership the United States Commissioner



PEANUT
OLIVE
RUBBER TREE
COCOANUT PALM
OIL PALM
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1—Blossom. 2—Fruit. 3—Fruit; shell split. 4—Seed. 5—Olive Fruit. 6—Blossom. 7—Fruit; cut lengthwise. 8—Seed. 9—Blossom. 10—Blossom; cut lengthwise. 11—Fruit. 12—Branch of Blossoms. 13—Blossom of Female Tree. 14—Fruit. 15—Fruit; cut in half. 16—Branch of Oil Palm Fruit. 17—Branch of Male Flowers. 18—Single Fruit. 19—Single Male Flower. 20—Single Female Flower.

of Education, school superintendents, college presidents, teachers, pupils, members of women's clubs and other organizations having its purpose at heart, which is to "promote the interest of international justice and fraternity," the education of children in sympathetic understanding of foreign affairs, the teaching of patriotism as "a sense of universal brotherhood," and the observance of Flag Day, July Fourth and Memorial Day in the same spirit.

Peach, the well-known fruit of a species of *Prunus* (*P. Persica*) which is native to China. Associated with the peach, in the genus *Prunus*, are the almond, plum, apricot and cherry. A smooth-skinned variety is called nectarine. The peach has long been cultivated and many varieties have been produced. They are extensively cultivated in the warmer parts of Asia as well as in certain regions of the United States. The pericarp. that is, the transformed ovary, ripens into an outer fleshy layer and an inner stony one. Cultivation has done much in increasing the thickness of the pulpy layer. The tree is small, from 10 to 20 feet high and bears many branches. The fragrant, pink blossoms usually appear before the leaves; the leaves are lanceolate. In this country peaches are grown in orchards, but in England they are trained against walls and also cultivated under glass. Peaches are cultivated in the United States most extensively in Maryland, Delaware, New Jersey, Michigan, Arkansas, Texas and on the Pacific slope. A great danger lies in the early blossoming and the killing of the fruit-buds by frost. Insect enemies are the peach-tree borer, the twig-borer, the fruit-tree bark-beetle, the peach-tree leaf-roller, scale insects and aphids. The trees must be carefully examined, and spraying is essential. They are subject to various fungous diseases, and under the best conditions are not long-lived.

Peach-Tree Borer, a larva that works much harm to the peach crop. The moth resembles a steel-blue wasp in appearance and emerges from its cocoon from late June to early September. It flies by day, and feeds on flowers. The eggs, brown in color, are glued to the bark of the peach or the pear close to the ground. As many as 700 have been counted in one female. They hatch in about a week. At once the tiny borer makes its way to the inner bark. Here it stays about ten months, feeding during this long period save in the coldest weather. It then makes a brown cocoon, usually placed near the ground and in about three weeks the adult insect emerges. In combating this grievous pest, trees should be gone over in September, May and late June, all gummy exudations watched and the larvæ dug out and destroyed. There are few natural enemies to assist in the extermination of the peach-tree borer.

Pea'cock, a bird belonging to the pheasant family and conspicuous for the beautiful train of the male. This train is not composed of the tail-feathers, but of long feathers which overlie those of the tail and are called tail-coverts. These, with the tail, are capable of being raised. The birds roost in trees or high places, and always sit facing the wind. They make their nests on the ground, of small sticks or leaves. The peacock is a native of India and Ceylon, and is plentiful in their forests and jungles. Their diet is varied, consisting of worms, reptiles, grain, flesh or fish etc. These birds have been naturalized in many parts of the world. The plumage of the male combines blue, green, gold and bronze tints. The tail-coverts are especially magnificent, with bright-colored eye-spots, and can be spread into the form of a huge fan. The blue tint is so characteristic that it has given rise to the name of peacock-blue. The proud, self-conscious air worn when showing off his splendors, has given rise to the phrase: "proud as a peacock." The bird is said not to exhibit these splendors save when sure of an audience. By the ancients the peacock was called the bird of Juno. But though the plumage is so beautiful, the voice is discordant, the utterance a scream. The flesh was once considered a great delicacy; peacock's liver being much in vogue at the old Roman banquets, and during the middle ages a cooked bird decked out in all its finery often appeared on the table of the rich. The female is not brilliantly colored, is brownish and is without showy tail-coverts. At first, both are alike in plumage, but the male begins to acquire gorgeous tints, and is in perfect plumage at the end of about three years.

Peale, Charles Wilson, an American portrait-painter, was born at Chestertown, Md., April 16, 1741. His education in art he received from a German painter and from Copley. His paintings are chiefly portraits, for which he was celebrated, among them being several of Washington. In 1785 he formed a collection of natural curiosities, founding Peale's Museum at Philadelphia. During the Revolutionary War he commanded a company at Trenton and at Germantown. He died at Philadelphia, Feb. 22, 1827.

Peale, Rem'brandt, an American painter, the son of Charles W. Peale, was born in Pennsylvania, Feb. 22, 1778. He painted portraits for awhile at Charleston, S. C., and then went to England and France to study his art. Besides his many portraits, he painted several historical pictures, among them the well-known *Roman Daughter;* and the *Court of Death*, *Notes on Italy* and *Portfolio of an Artist*, were published by him. He died at Philadelphia, Oct. 3, 1860.

Peanut. The pod and seed of an annual plant (*arachis hypogaia*) which belongs to the pea family. It grows to a height of one to two feet. After its flower has faded, the stalk buries itself in the ground, where a number of yellowish seed pods are developed. These when mature are the peanut of the market. Peanuts thrive best in a light sandy loam, and in a moist, warm climate. In the south peanuts are more commonly known as goobers or goober peas. They are grown principally in Virginia, North Carolina, Georgia and Tennessee. The crop has become an important one. Virginia leads with an annual yield of nearly 4,000,000 bushels. A large part of the crop is used for roasted peanuts, and a high value is placed on the peanut for forage and hay. The annual consumption of peanuts amounts to over 33,000,000 bushels. The peanut is cheap and its food-value high. In the manufacture of peanut-butter and confectionery it has come to be extensively used.

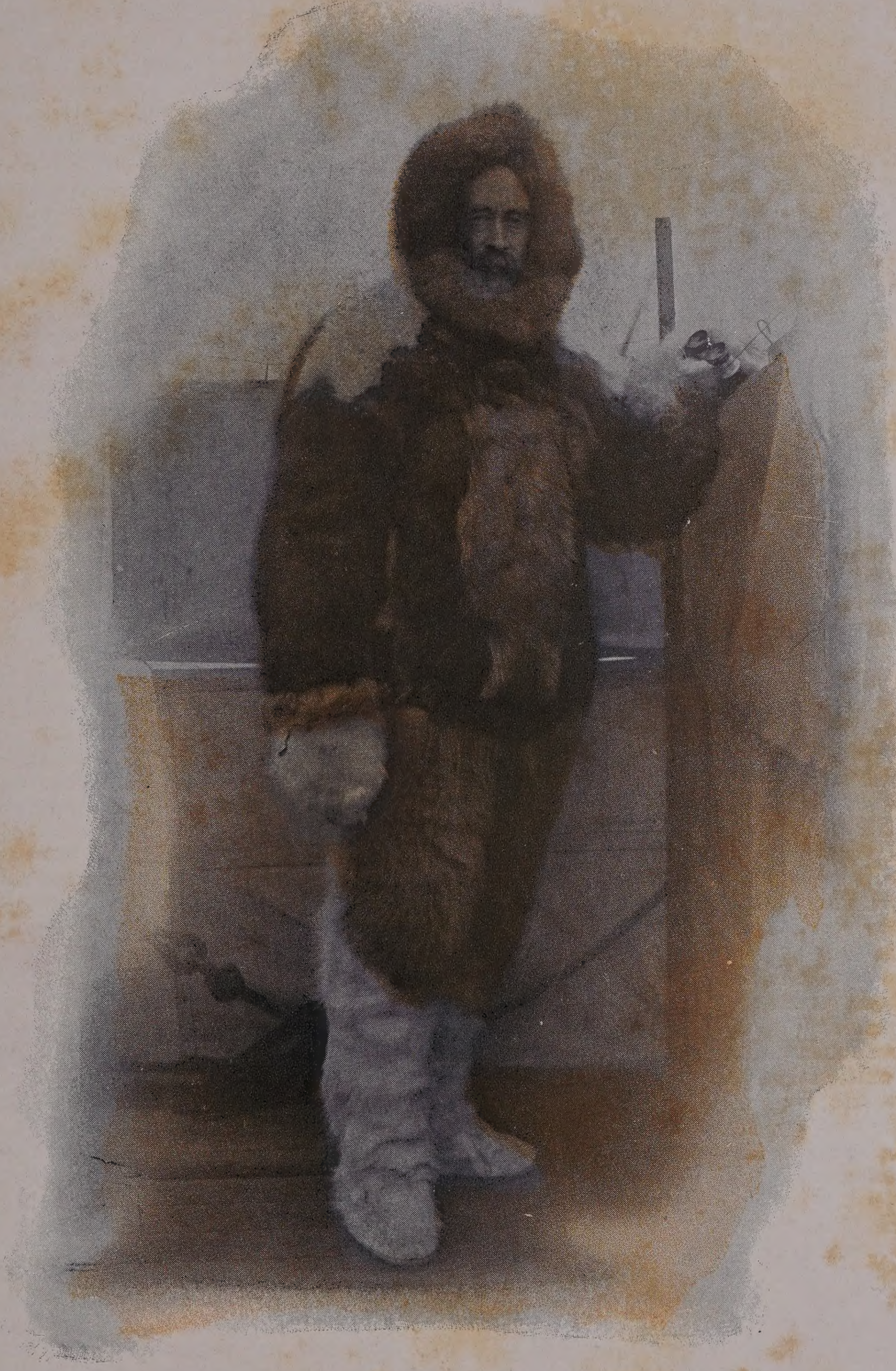
Pear, a species of *Pirus* (*P. communis*) cultivated from Europe, a member of the rose family. It is associated in the same genus with the apple and quince. The tree in form inclines to the pryamidal, otherwise it resembles the apple. The flowers as a rule are white. The peculiarity of the fruit is that the flesh consists of the transformed cup, upon whose rim the sepals, petals and stamens arise. It is often spoken of as the calyx, but it represents a support common to all three of the outer floral organs. This type of fruit, with flesh developed from the part of the flower which surrounds the ovary, is called a pome. The ripened ovary is represented by the core. The pear has been cultivated from the most ancient times, and has reached a high degree of perfection. It is highly regarded as a dessert fruit, and is extensively canned and preserved. It holds fourth place among our orchard-fruits. Particular attention is paid to cultivation in the regions between New England and the Great Lakes, in California and in portions of Oregon and Washington. Almost innumerable varieties have been produced, each with its appropriate name. In a wild or neglected state the branches are more or less thorny, but under cultivation the thorns disappear. For a parasitic fungus that attacks both fruit and foliage Bordeaux mixture is recommended. Borers and the codlin moth are insect enemies that work some damage; the former must be dug out once or twice a year, for the latter arsenical sprays should be used. See Bailey's *Cyclopedia of American Horticulture.*

Pearl, one of the gems found in certain sea and fresh-water shells. Shells generally are lined by the animals inhabiting them with a material which gives them a smooth surface. It is laid in thin, partly transparent plates, which produce a beautiful play of colors. This lining is called mother-of-pearl or nacre. On opening the shells, there are sometimes found rounded portions of this nacre, which have been formed by throwing layers of this lining material around a grain of sand or a minute vegetable or animal growth. These are the pearls used in trade and worn as ornaments. They vary greatly in size, those about as large as a pea being the best. The largest one known is two inches long and four around. The smallest are called seed-pearls. The value depends upon size, shape, color and freedom from imperfections. The round ones are the best, the button-shaped next and the drop or pear-shaped least. Pearls, when perfectly round and of extraordinary beauty, sell for large sums; the single pearl which Cleopatra is said to have dissolved and swallowed was valued at over $400,000. The finest pearls are found close to the lips of the shell or in the soft part of the oyster near the hinge. The largest pearl fishery in America is that of Lower California, from which come the largest and finest black pearls in the market. The most famous pearls are from the east, especially from the Persian Gulf and from Ceylon. In Ceylon fishing lasts four to six weeks. Each boat has a crew of 13 men and 10 divers, five of whom rest while the other five are diving. The work has to be done very rapidly, as the best divers cannot stay longer than 80 seconds in the water. When a boatload of oysters has been obtained, the cargo is landed and piled on the shore to rot, so that the pearls can be easily found. When washing out the dead animals, a close watch is kept for loose pearls, which are always the finest, while those attached to the shells are removed by pincers or a hammer. In 1889 in 22 days 50 divers brought up 11,000,000 oysters. River-pearls are found in fresh-water shells in Scotland, Wales, Ireland, Russia, Germany, Canada, the United States and China. The chief river-pearl fisheries in the United States are in the streams of the Mississippi Valley; in Wisconsin, Iowa, Kentucky, Ohio and Arkansas. The lining of the shells, mother-of-pearl, is used largely in making buttons, knife and fork handles and inlaid work on furniture. See *Gems and Precious Stones of North America* by Kunz and *Pearls and Pearling Life* by Streeter.

Pearl, a river in Mississippi, rising in the center of the state and flowing south into the Gulf of Mexico. It forms part of the boundary between Louisiana and Mississippi. The river is 300 miles long and is obstructed by sandbars and driftwood.

Pearl Harbor, on the southern coast of Oahu, a Hawaiian island, and adjacent to Honolulu, is a land-locked harbor, 8 miles long by 4 wide, with a depth of water from 30 to 130 feet. It has great strategic value to the United States from the fact that it can be made an impregnable naval base

THE DISCOVERER OF THE NORTH POLE



REAR ADMIRAL ROBERT E. PEARY

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where the largest fleet can lie safely. Reservations for a firstclass naval station have been secured, as also for a military reservation on the slopes of the mountain range in the rear. General Schofield after an inspection of Pearl Harbor in 1872 reported that "it could be completely defended by inexpensive batteries on either or both shores, firing across a narrow channel of entrance. Its waters are deep enough for the largest vessels of war and its lochs are spacious enough for a large number of vessels to ride at anchor in perfect security against all storms." See HAWAII.

Pear'sons, Daniel Kimball, an American philanthropist, was born at Bedford, Vt., April 14, 1820. He graduated in medicine at Woodstock, Vt., and practiced in Chicopee, Mass., until 1857. He became a farmer in Ogle County, Ill., in 1857, but in 1860 removed to Chicago, where he rapidly accumulated a large fortune in real estate. For some years he served the city as alderman, and assisted in managing its financial budgets. He was best known through his large gifts to educational eleemosynary institutions, the Presbyterian Hospital of Chicago and Chicago Theological Seminary (Congregational) being especially favored. There are few of the smaller colleges to which he did not give from $25,000 to $250,000, and his gifts run well up into the millions. He died April 27, 1912.

Peary, Rear Admiral, **Robert Edwin,** discoverer of the North Pole, was born at Cresson, Pa., May 6, 1856. He graduated from Bowdoin College in 1877. He entered the U. S. Navy as a civil engineer Oct. 26, 1881. For several years he was engaged in surveys connected with the Nicaragua Ship Canal, but in 1886 made a trip to Greenland (*q. v.*). In 1891-2 his crossing of Greenland's northeastern corner was one of the most remarkable sledge-journeys ever made. He showed that the eastern and western coasts meet; discovered Melville and Heilprin Lands; made a second expedition to North Greenland, 1893-95; Arctic summer voyages, 1896, 1897; discovered and secured the Cape York meteorities, the largest in the world; in 1900 determined Greenland's northern limit by rounding it; demonstrated that for a considerable distance northward and northeastward there is no land and showed the origin of floebergs and paleocrystic ice. During his 1905-6 expedition he left his ship at 82°27′ N., and made a sledge-trip to 87°6′ N., 200.36 miles from the pole, the most northerly point yet reached. Sailing from New York in July 1908 he wintered at Cape Sheridan, Grant Land. Feb. 15, 1909 he started with a sledge train for the pole. On April 6, the pole was reached, the crowning triumph of twenty-three years of heroic effort. Returning he reached Indiana Harbor, Sept. 6, and announced by wireless "Stars and Stripes nailed to North Pole." He was made rear admiral and received the thanks of congress. In 1913 he was made grand officer of the Legion d'Honneur, by the president of France. He died in 1920.

Peary wrote *Northward Over the Great Ice*, *Nearest the Pole*, *The North Pole*, and *Snowland Folk*.

His wife wrote, *My Arctic Journal*, *The Snow Baby*, and *Children of the Arctic*. (See POLAR EXPLORATION.)

Peas'ants' War, an insurrection of the German peasantry, which broke out in 1524, against the oppressions they were suffering at the hands of the nobility and clergy. For a short time it seemed that the peasants would carry everything before them, as they defeated the army sent against them by Archduke Ferdinand, under the command of Von Waldburg; and a number of princes and knights concluded treaties with them, conceding their principal demands. But, unfortunately, the conduct of the insurgents did not accord with the moderation of their demands, as they destroyed convents and castles (more than 1,000 in all), murdered, pillaged and committed other great excesses. In May and June, 1525, they sustained a number of crushing defeats, and were soon after completely overthrown. Multitudes were hanged in the streets, and others were put to death with the most terrible tortures. It is estimated that 150,000 lives were lost during the short period of the Peasants' War.

Peat, a substance formed by the decomposition of plants in marshes and morasses; it is also sometimes described as a kind of soil formed by the remains of mosses and other marsh-plants. The remains of plants are often so well-preserved in peat that their species can be easily determined; but in the northern parts of the world it is chiefly formed from certain kinds or species of bog-moss. These mosses grow in very wet places, and throw out new shoots from their upper parts, while their lower parts are decaying and forming peat, so that shallow pools are gradually changed into bogs. Moist peat is a decided and powerful antiseptic, as is shown in the preservation not only of ancient trees, leaves and fruits but of animal bodies. It is claimed that in some instances human bodies have been found preserved in peat after the lapse of centuries. Peat is formed only in the colder regions of the world, as in warmer regions vegetable substances decompose too rapidly. Peat is largely used for fuel in Holland, Denmark, Scotland, Ireland and other European countries, and efforts have been made to bring it into more general use by compressing its bulk, but although numerous machines have been invented and patented for this purpose, the enterprise has not yet proved a complete success.